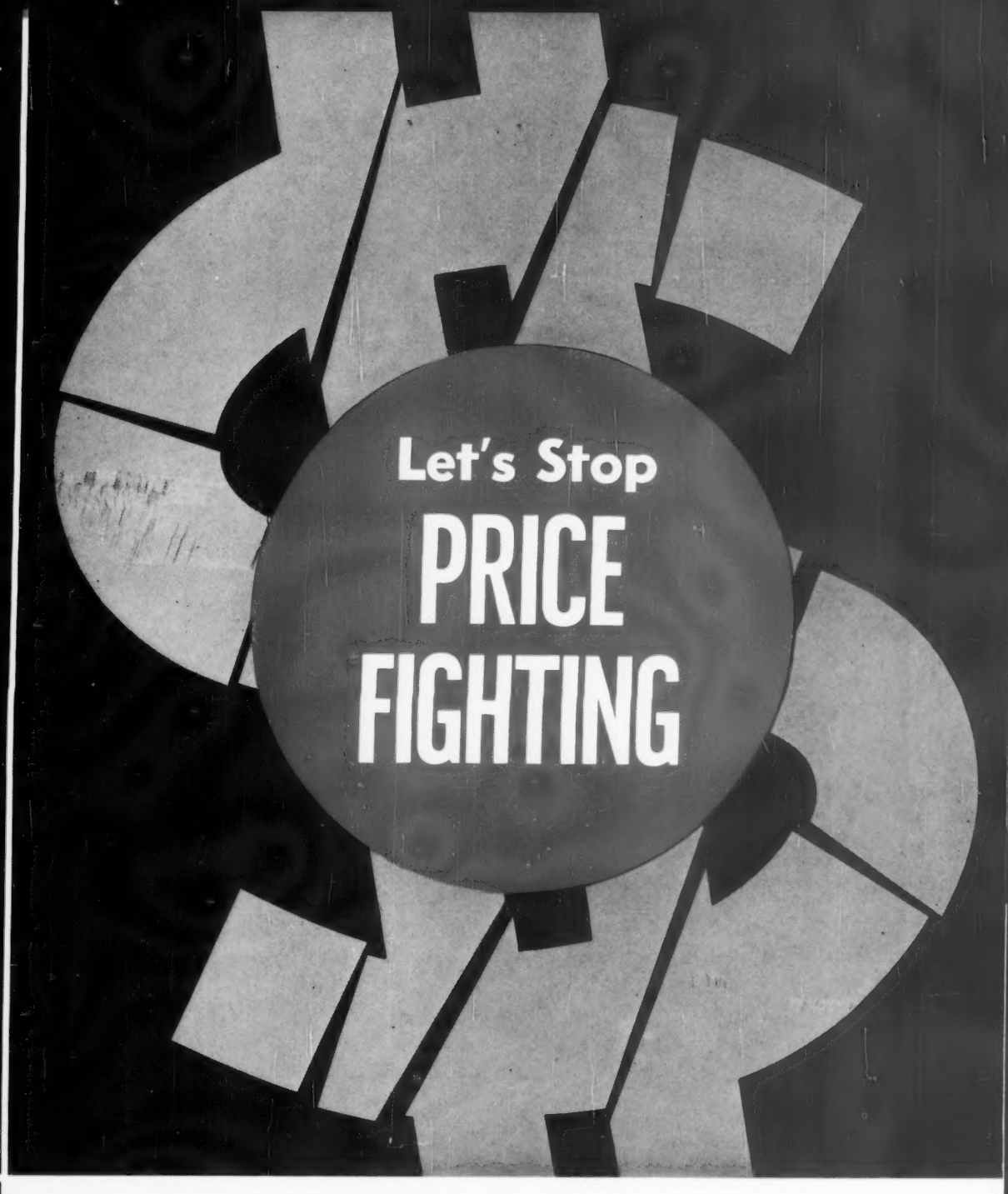
STEEL The Metalworking Weekly

APRIL 17, 1961

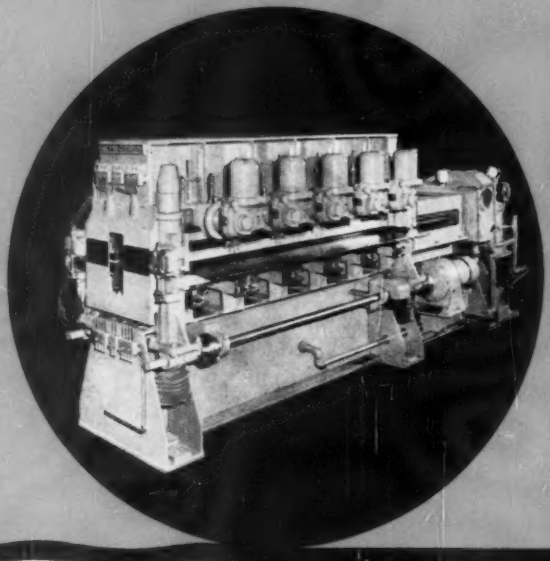


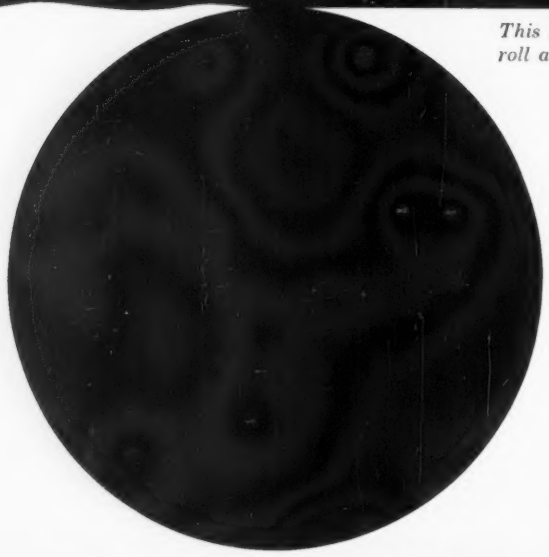
Metalworking lost millions in profits last year because of price fighting. The toll may be even higher in 1961 as cost ignorance, ruthlessness, and cowardice perpetuate the senseless warfare. That's why STEEL is publishing this special issue which shows how to halt the economic waste . . . Page 47

METALWORKING WEEK—PAGE 17
COMPLETE CONTENTS—PAGE 19

ROLLER LEVELERS

What kind of roller leveler do you need for your particular product? Want high speed? We have high speed levelers. Want an economical model for less demanding work? We have one of the best models in the business. Want a quick opening head? We have either hydraulic or motor-operated or hand-operated models. Want centralized lubrication? We equip all levelers with centralized lubrication with the exception of a few models. Want antifluting? We have it. Want individual adjustment or centralized adjustment? We have both types. Want more roll life per redressing? All of our rolls are induction hardened. Want an existing leveler reconditioned? We have an efficient service setup. What size leveler do you need — 1⅛" up to 18" diameter work rolls? We make all sizes and types. In fact, the Aetna-Standard Division of Blaw-Knox is one of the major manufacturers of Roller Levelers. For information, write to Sheet and Strip Sales, Aetna-Standard Division, Blaw-Knox Company, 300 Sixth Avenue, Pittsburgh, Pennsylvania.





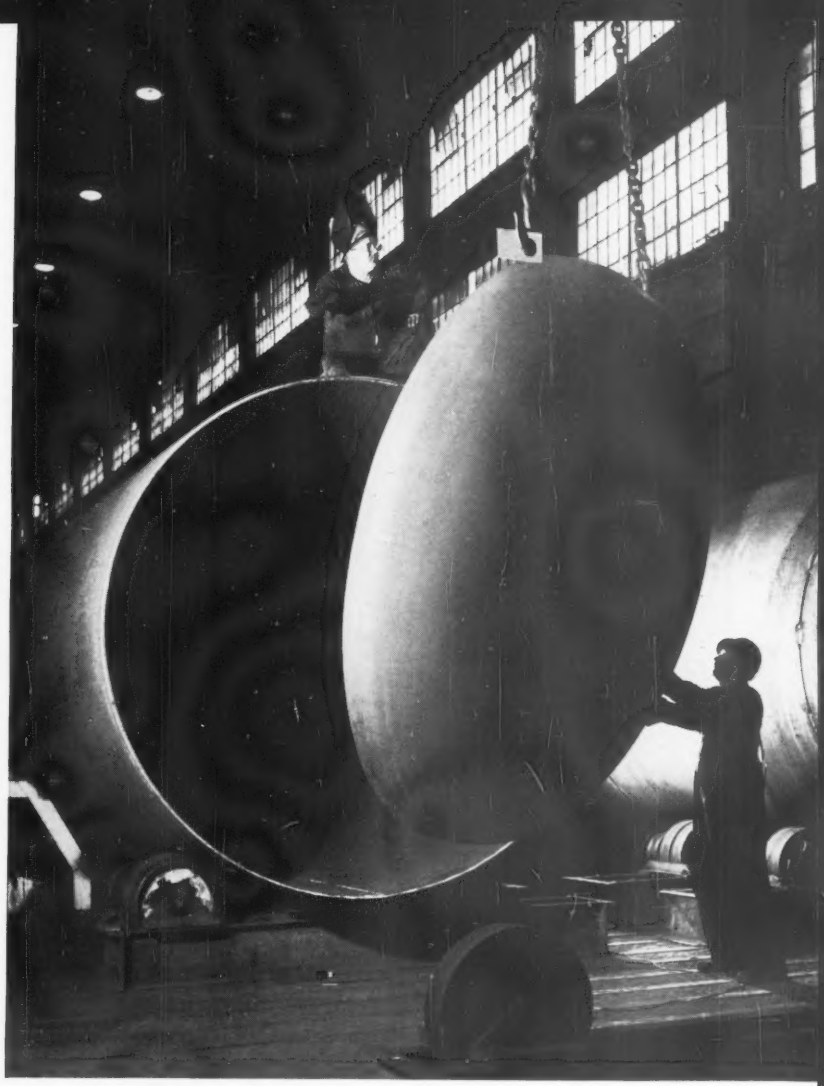
This Roller Leveler has individual motor-operated backup roll adjustments. 1¾" dia. x 72" face . . . 21 rolls.

BLAW-KNOX

Aetna-Standard Division

BLAW-KNOX

How to save money when you buy heads



A number of suggestions that may help you to reduce costs are contained in our new folder "Pertinent Facts on Purchasing Flanged and Dished Heads." Factors that govern the price of heads are described, and a list of the required data for orders and inquiries is included. Ordering from our stock sizes at Sparrows Point, Md., may save you time and money; a full list is contained in the folder. A copy is yours for the asking at any Bethlehem sales office.

Bethlehem makes flanged-and-dished heads to meet virtually every requirement: ASME Code, elliptical and standard flanged-and-dished. Also flanged-only, dished-only, shallow-dished, double-dished, and heads for special requirements.

Bethlehem heads are available in diameters up to 144-in. —and in thicknesses from 14 gage to 2½-in. We also produce standard manhole and hand-hole saddles, covers and fittings, as well as heads with flued openings. A number of sizes of ASME Code flanged-and-dished heads are stocked for prompt delivery.

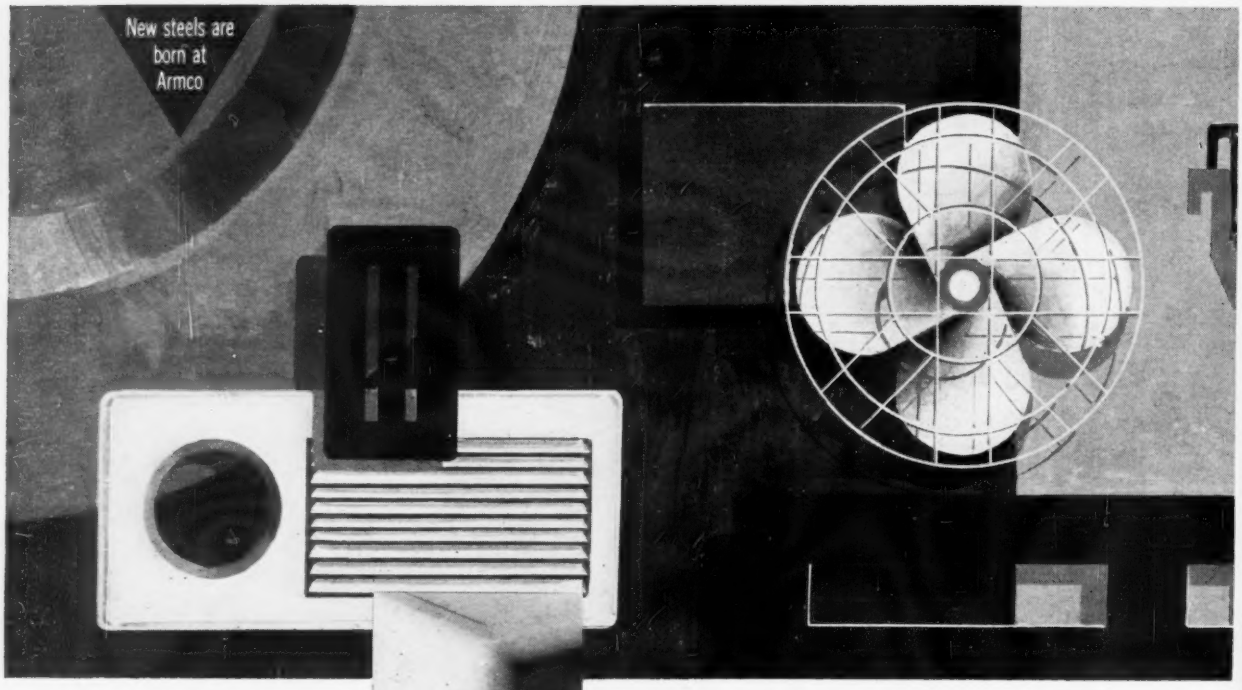
Steel
for Strength
. . . Economy
. . . Versatility

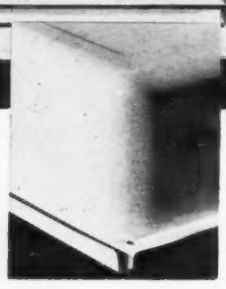
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

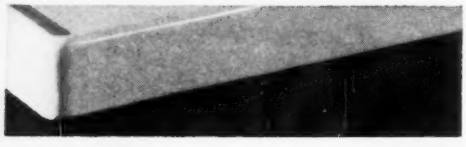
BETHLEHEM STEEL

BETHLEHEM STEEL

Now—durable, low-cost porcelain





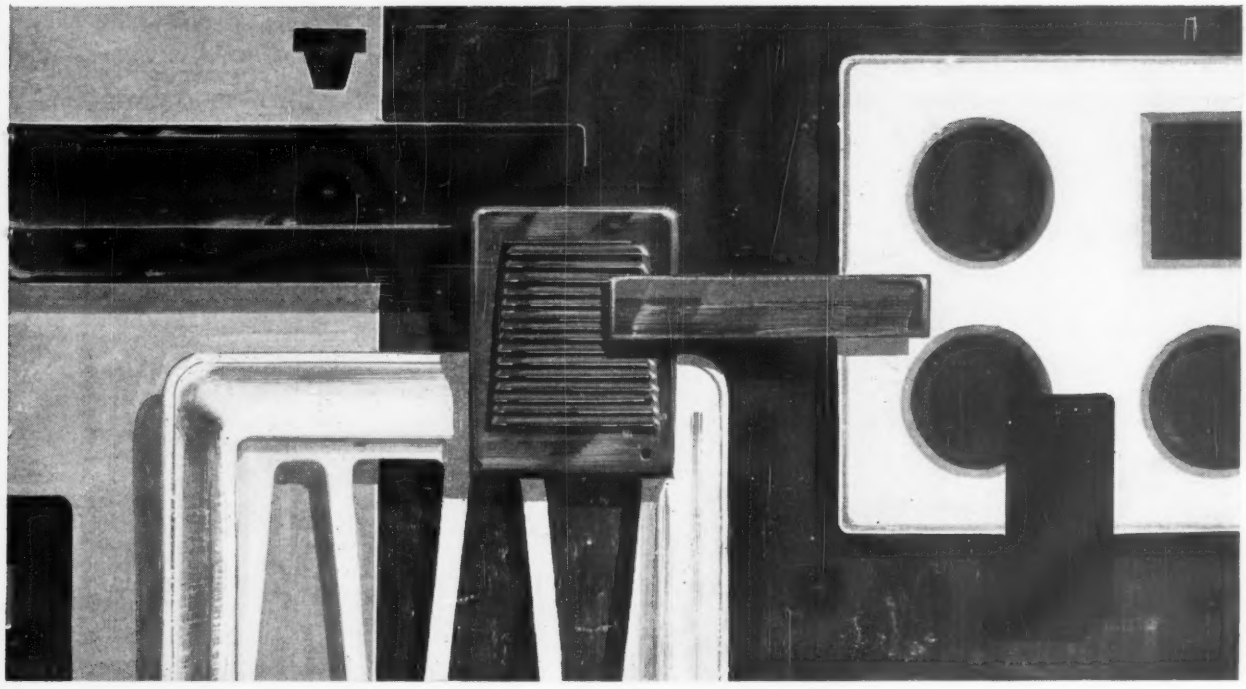


Porcelain Enameled Steel

Use this label to identify modern, durable steels in your products

enamel on Armco UNIVIT

Cost of porcelain enamel
on UNIVIT compares favorably with baked enamel or vinyl finishes



"Direct-on" porcelain enameling with new Armco UNIVIT® assures real production economy. As a result, applications where baked enamel or vinyl finishes are now used come within the cost range of durable, service proved porcelain enamel.

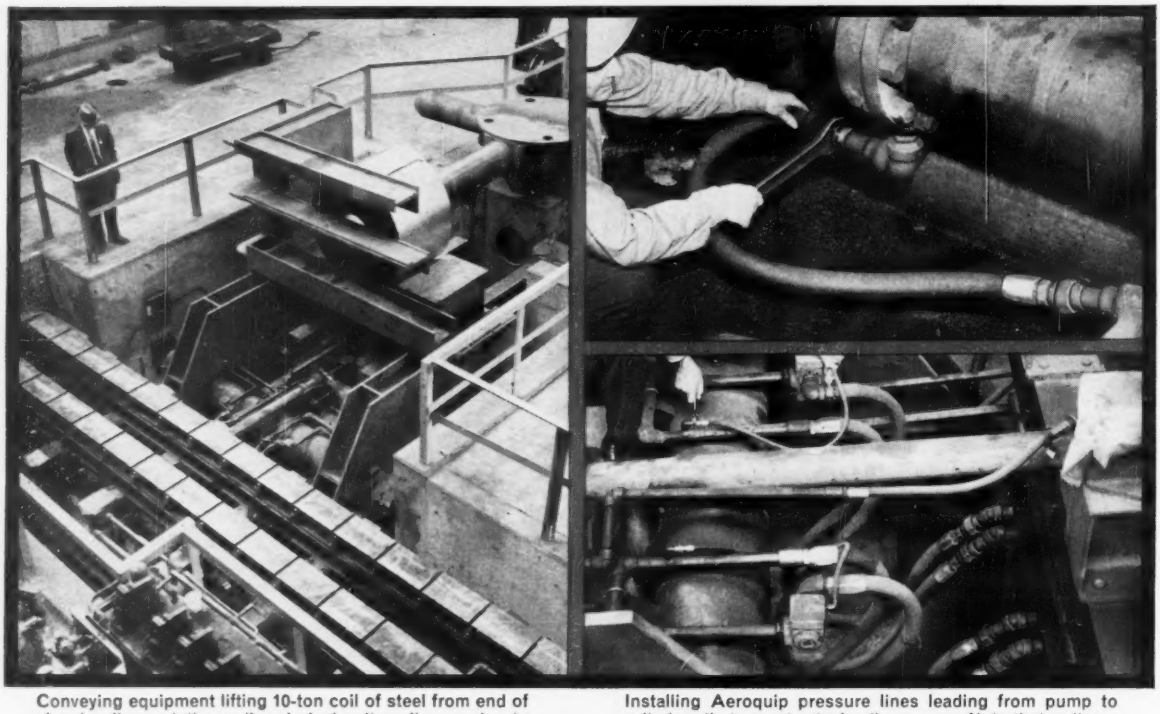
UNIVIT permits one-coat, one-fire porcelain enameling without danger of boiling or fishscaling. The smooth, attractive finish fights abrasion and corrosion, provides exceptional resistance to mechanical damage and thermal shock.

For superior two-coat enameling, Armco produces Armco Enameling Iron, long known as "The World's Standard" for fine porcelain enamel finishes. Behind both grades is Armco's unmatched production record and service experience developed through more than 50 years as the world's foremost supplier of base metal for high-quality porcelain enameling. Armco Division, Armco Steel Corporation, 1391 Curtis Street, Middletown, Ohio.

ARMCO **Armco Division**

Aeroquip Hose and Reusable Fittings help lift 10-ton steel coils 96 times a day

Installation at Granite City Steel Company, Granite City, Illinois



Conveying equipment lifting 10-ton coil of steel from end of cleaning line, rotating coil and placing it on line moving to annealing floor.

Installing Aeroquip pressure lines leading from pump to cylinders that operate steel coil conveyor. Note that ordinary hand tools are being used.

Hose line dependability is vital to heavy-duty conveying equipment that relies on hydraulic pressure to move 20,000 pound coils of steel—four times an hour—eight hours a day—three shifts a day. Hose line failures could be costly and time-consuming.

To help reduce downtime and hold maintenance to a minimum level, the Granite City Steel Company selected the Aeroquip Hose and Reusable Fittings that most completely met the rigorous application requirements of their steel coil conveyor line. The flexible lines of Aeroquip Hose and Reusable Fittings handle constant hydraulic pressures of 800 psi and surge peaks of 950 psi, during each phase of the conveying operation with positive reliability.

Discuss your requirements with your Aeroquip Distributor. He is a fluid line specialist who will analyze your problems, without obligation. Look for his telephone number in the "Yellow Pages" under "Hose." For ready reference to the comprehensive Aeroquip line write for a copy of Industrial Catalog No. 205.

Aeroquip Hose and Reusable Fittings can be assembled on the job. Fittings can be used over and over again.

Aeroquip

AEROQUIP CORPORATION, JACKSON, MICH.
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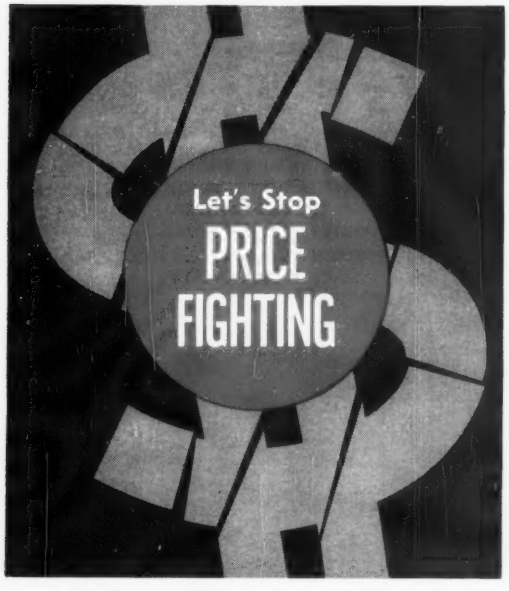

Our cover for this issue bears repeating. The editors have put together a valuable study on how to stop price fighting, the most difficult problem facing you metalworking managers in 1961.

To do the job, 13 editors traveled more than 3000 miles to gather material in Cleveland, New York, Chicago, Pittsburgh, Detroit, Washington, Milwaukee, Boston, and Buffalo.

Bound reprints of the study on price fighting (beginning on Page 47) are available at $2 a single copy; prices for larger quantities can be had on request. Write Reprint Dept., STEEL, Penton Bldg., Cleveland 13, Ohio.

Art for Your Sake

Our artists had a mighty role to play in our price fighting report too. Art Director Bill Kellogg set the pace, artistically, for the general appearance of this issue. Tom Bryan did the cover, the cartoons, and some of the layouts. Tom Welsh also executed many of the layouts.

Happy Hunting

How do editors know when they have an unusually hot subject, such as price fighting?

There's a certain "feel" about the story, they tell us. People are eager to talk. And a hot story also often turns up coincidences.

Example: The editors found while gathering material on price fighting that Eddy-Rucker-Nickels Co., a management consulting firm, was preparing a report on the subject too. Its material was useful, especially its Profit-O-Meter, an adaptation of which appears on Pages 48-49. You can get the original meter from E-R-N, Harvard Square, Cambridge 38, Mass., for $1 per copy.

Small Print

Every week as we spout off at the typewriter, we wish we had a little more space on this page. For example, couldn't we get rid of that small type down at the bottom and thus gain a few lines?

We inquired. We have returned, chastened, to our orange crate desk to ponder and reflect.

The message you see below (set in 5 point Regal, by the way, reports Typographer Charley Van Dame) is required by Section 133.3 of the Postal Manual. Since it must appear on one of the first five pages of each issue, we are the lucky custodian because ours is the first editorial page.

Triumph in Pittsburgh

The lady honored on the marquee above is Mrs. Josephine M. Shea (dressed in white, with large handbag, center). The Pittsburgh Advertising Club named her Advertising Woman of the Year. And no wonder. Capping her many triumphs, she has been appointed advertising manager for Crucible Steel Co. of America.

As you may guess, there are about as many women who are advertising managers in big basic steel companies as there are Rosetta stones.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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KEY TO BETTER PRODUCTS AT LOWER ASSEMBLY COST

Hubbell c/h* turns out parts **faster, better** and at **less cost** than screw machining ever could . . . they're **stronger,** more **accurate** and more **uniform.**

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...Fluid Power news

OILGEAR 40 Years of Fluid Power

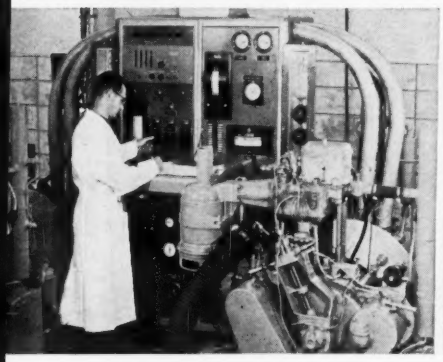
Report No. 12,400 From Oilgear *Application-Engineering* Files

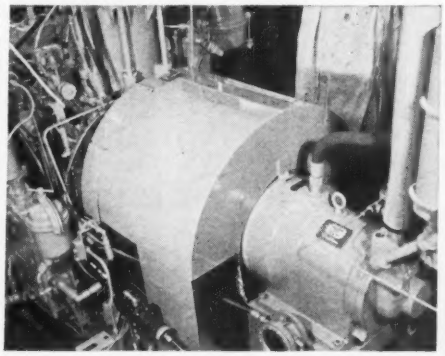
HOW OILGEAR-ESSO RESEARCH TEAMWORK SOLVED NEED FOR MORE COMPACT, LOWER COST, RELIABLE, HIGHLY ACCURATE, DYNAMOMETER AND STARTER SYSTEMS

USER: *Esso Research and Engineering Corp., Linden, New Jersey*

PROBLEM: New Equipment to conduct the exhaustive, standardized performance tests on all new fuels and lubricants, as required by the oil companies and engine manufacturers — to guarantee top-quality petroleum products for optimum consumer engine performance. These extended tests — carefully recorded and regulated from operating control centers — are performed with *standard test* engines coupled to load-absorbing dynamometers. Cradled, expensive electrical load absorbers were previously used to provide test engine control.

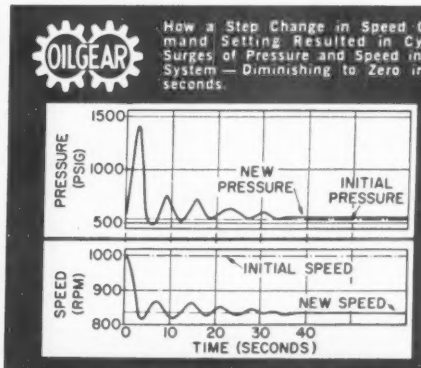
ESSO RESEARCH REQUIREMENTS FOR A NEW DYNAMOMETER SYSTEM WERE: 1. Sharply reduce installed cost and valuable test floor space. 2. Insure absolutely reliable, precise, loading and speed control over continuous periods up to 1,000 hours per test. 3. Simplify test engine starting methods — normally 50-hp motors are used to overcome high starting torques, due to heavy flywheels and high internal friction. 4. Long life, maximum trouble-, and maintenance-free durability.

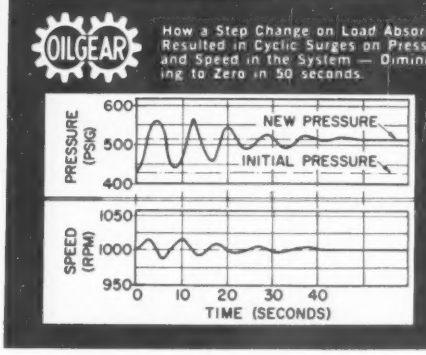




LEFT: One of the **Oilgear-Esso Research** centralized control centers for complete recording, regulation, control, and operation of two test engines, and the Oilgear servo-valve-controlled Dynamometer and Starters connected to them. **RIGHT:** Rear view of 5¾" bore by 8" stroke, Standard Single Cylinder Test Engine with Oilgear servo-valve-controlled Dynamometer/Starter. This efficient, compact, Oilgear pump/motor unit is shaft-coupled to the test engine . . . cranks the engine for starting — then absorbs all power produced during testing. Other system equipment — Oilgear servo-valve "Power Paks" that regulate the loads imposed on the test engines and Oilgear remote, air-controlled Type "DA" Variable Displacement Pump used for starting the test engines — are mounted on the floor above to free valuable test floor area for additional testing units.

SERVOCONTROL* — Single-Stage, Four-Way Servo Valve without enclosure . . . exclusive "**Swing-Plate**" design . . . only one moving part . . . no metal-to-metal contact . . . as used with this installation.
*A Division of The Oilgear Company





SOLUTION: A completely new servo-valve-controlled *Dynamometer and Starting System* was *Application-Engineered* by Oilgear's Servocontrol Division. In addition to meeting all engine control and starting requirements, these new systems were installed *at 50% of the cost of comparable "universal" electric dynamometer systems.* Addition of two more test units to this system will result in a saving of 65% for the four-ganged arrangement. The unusual, centralized starting system has adequate capacity to start a large number of test engines — one at a time — and maintain the required supercharge on the dynamometer pump/motors during test-loading. Oilgear loading Pump/Motors permit more compact installations than equivalent capacity alternate systems. Simple safety interlocks protect the equipment, and guarantee positive, correct operating sequence of all starting and loading test procedures.

ESSO RESEARCH REPORTS — *"Other than installed cost and space saving, the prime requirement of this dynamometer was to maintain a constant speed for variations in temperature, engine torque, etc. This system maintains an accuracy of 1 rpm at an engine speed of 1000 rpm — or a speed accuracy of 0.1%.*

Information contained in this Fluid Power News Report is condensed from a paper entitled, "Electro-Hydraulic Dynamometer and Starter for Laboratory Test Engine" — by J. W. Broome, Chief Engineer, Servocontrol Division of The Oilgear Company, and R. L. Van Voorhies, Senior Engineer, Mechanical Division, Esso Research and Engineering Company . . . presented at the NCIH — Chicago, Illinois. OILGEAR — SERVOCONTROL are trademarks of The Oilgear Company.

By sizing the hydraulic equipment to torque and speed required, these same fundamental components can be applied to other dynamometer applications . . . and for controlling other variables. OILGEAR-SERVOCONTROL can supply *everything* a carefully engineered system requires . . . reduce delays, costly machine downtime due to malfunctioning, and actually save you money on engineering, components wiring, piping, installation and testing costs — PLUS the assurance that only a "single-source, single-responsibility" can give.

For practical, lowest-cost-per-year solutions to YOUR rotary or linear drive and control problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements, directly to . . .

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N-A-XTRA 100

NOW CODE-APPROVED FOR DESIGN OF UNFIRED PRESSURE VESSELS

A.S.M.E. CASE NO. 1297. Code approval granted by the American Society of Mechanical Engineers now makes N-A-XTRA 100 steel the logical material for use in unfired pressure vessels. This high-strength steel is fully quenched and tempered—permits greater savings and efficiency in fabrication, erection, handling, welding and shipping. Its high strength/weight ratio cuts dead weight. It cold forms readily, welds under constrained conditions without underbead cracking. These benefits are the result of the outstanding characteristics of N-A-XTRA 100 . . .

MECHANICAL PROPERTIES

Tensile Strength, psi	115/135,000
Yield Strength, psi	100,000 min.

Notch toughness at exceptionally low temperatures

CHEMICAL COMPOSITION

Carbon	.15/.20
Manganese	.80/1.10
Phosphorus, max.	.035
Sulphur, max.	.040
Silicon	.50/.80
Chromium	.50/.80
Molybdenum	.18/.28
Zirconium	.05/.15

Make a note now. For larger, stronger or lighter pressure vessels —from mobile tankers to stationary storage tanks—specify code-approved N-A-XTRA 100.

Great Lakes Steel Corporation
Product Development, Dept. S-6
P. O. Box 7310
Detroit 2, Michigan

Please send me complete copy of the A.S.M.E. Code Case No. 1297.

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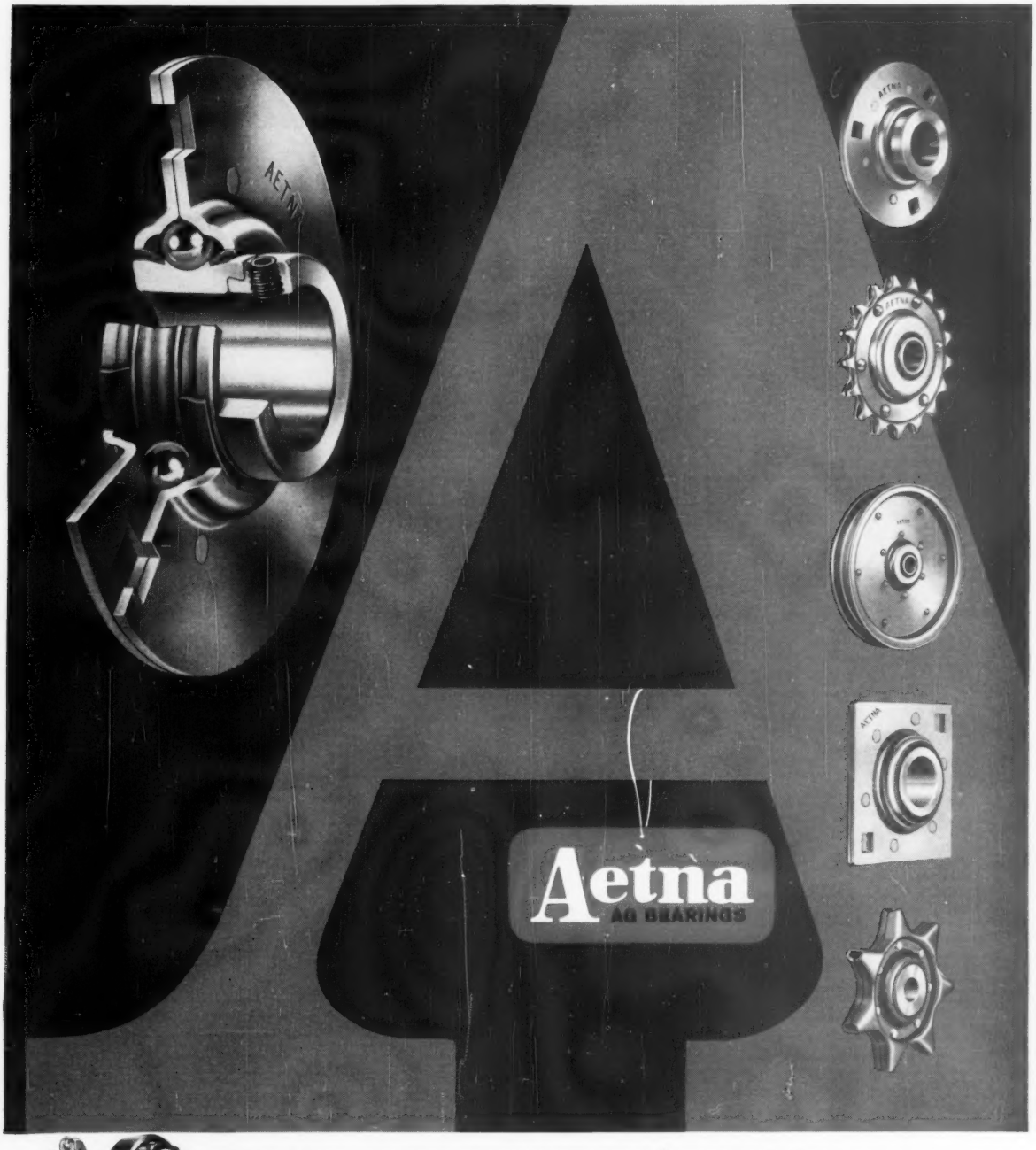

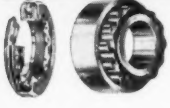

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JOMAC GLOVES GIVE CUT PROTECTION THAT EVEN LEATHER CAN'T

The remarkable cut resistance of Jomac's loop-pile fabric glove is a *plus* that even expensive leather gloves do not provide. Moreover, Jomac gloves offer a better grip on oily surfaces and can be reconditioned time after time.

For maximum hand protection, it's North PVC Gloves. They offer better fit, greater dexterity, more comfort and superior safety in handling chemicals, oils and greases.

To keep outdoor workers dry, comfortable and safe in foul weather, insist on North PVC Wet-Weather Clothing . . . resistant to most oils, greases and chemicals, tough, flexible, non-aging and waterproof.

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"Jomac Sells Quality . . . and Quality Sells Jomac!"

CALENDAR OF MEETINGS

Apr. 23-26, American Society of Mechanical Engineers: Metals engineering conference, Penn Sheraton Hotel, Pittsburgh. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

May 8-12, American Foundrymen's Society: Castings Congress, Sheraton-Palace Hotel, San Francisco. Society's address: Golf and Wolf Roads, Des Plaines, Ill. General manager: W. W. Maloney.

May 9-11, Material Handling Institute Inc.: Technical conference and Eastern States Show, Trade and Convention Center, Philadelphia. Information: Shea Expositions Corp., 1 Gateway Center, Pittsburgh 22, Pa. General conference chairman: Robert B. McKee.

May 10-12, Society for Experimental Stress Analysis: Spring meeting and exhibit, Benjamin Franklin Hotel, Philadelphia. Society's address: P. O. Box 168, Cambridge 39, Mass. Secretary-treasurer: W. M. Murray.

May 14-17, Automotive Engine Rebuilders Association: Annual convention, Fontainebleau Hotel, Miami Beach, Fla. Association's address: 901 Roosevelt Bldg., Indianapolis 4, Ind. Executive vice president: James H. Templin.

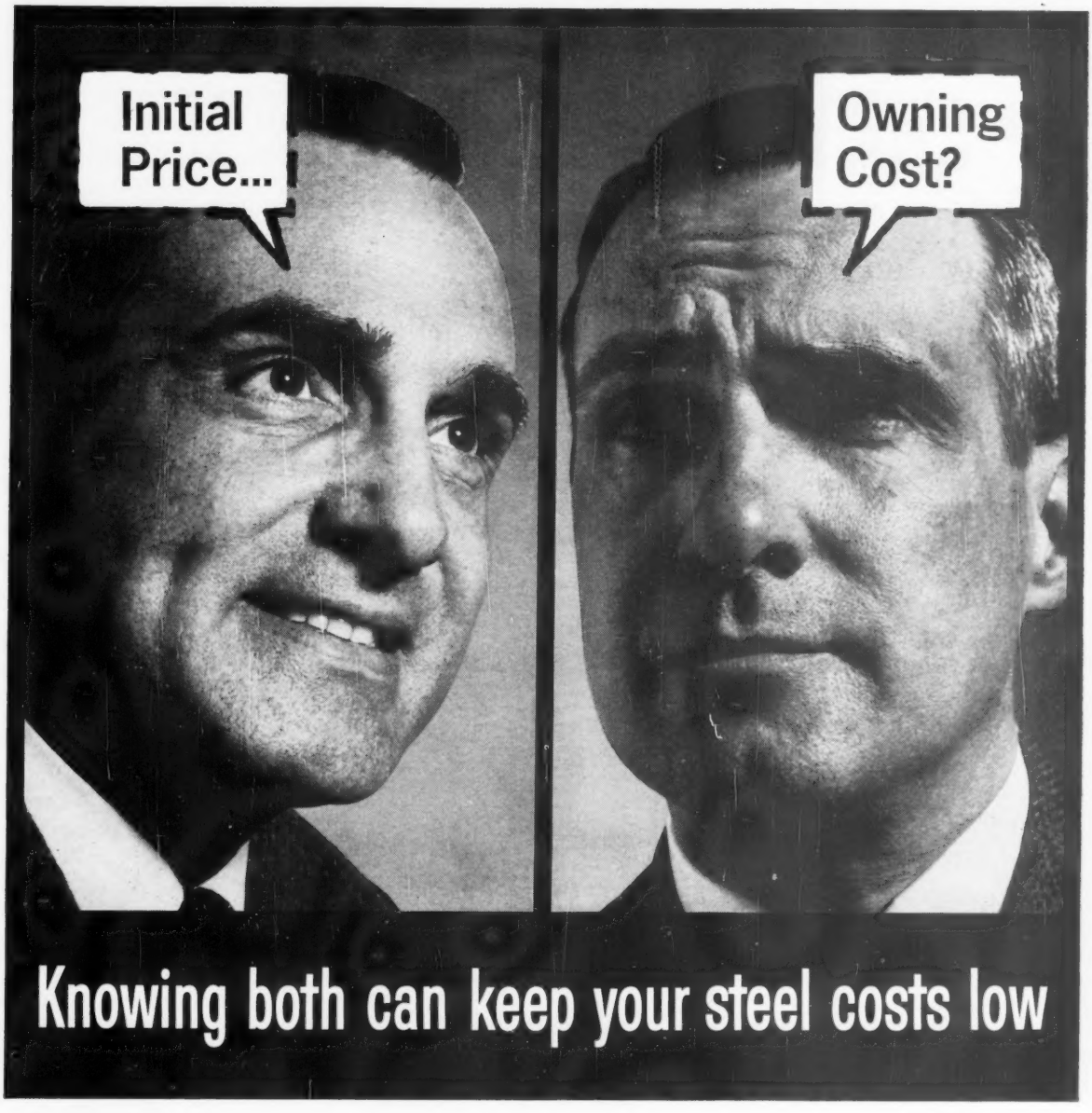
May 14-17, Copper & Brass Research Association: Annual convention and exhibit, Homestead Hotel, Hot Springs, Va. Association's address: 420 Lexington Ave., New York 17, N. Y. Managing director: Theodore E. Veltfort.

May 14-17, National Fluid Power Association: Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: 5595 N. Hollywood Ave., Milwaukee 17, Wis.

May 14-17, Steel Service Center Institute: Annual meeting, Statler-Hilton Hotel, Washington. Institute's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive vice president: Robert G. Welch.

May 15-18, American Mining Congress: Coal show and exhibit, Public Auditorium, Cleveland. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president: Julian D. Conover.

May 15-18, Machinery Dealer's National Association: Annual meeting, Shoreham Hotel, Washington. Association's address: 1346 Connecticut Ave. N.W., Washington 6, D. C. Executive director: R. K. Vinson.



Knowing both can keep your steel costs low

Steel is low in cost. If your *final* cost figure doesn't reflect that, then unnecessary, hidden expenses may be creeping into your operations. If you haven't done so, figure your costs of possession —like taxes and insurance, storing and handling. They may be adding to *your* steel costs. Often your steel service center can help you reduce them.

Each steel user's case is different. Ask your steel service center to help you determine the most economical way to buy steel. They will give you a helpful guide for figuring all your costs of possession, such as:

Cost of capital:	Cost of operation:	Other costs:
Inventory	Space	Obsolescence
Space	Material handling	Insurance
Equipment	Cutting & burning	Taxes
	Scrap & wastage	Accounting

Call your nearby steel service center, or write for free booklet, "What's Your Real Cost of Possession for Steel?"

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Steel

STEEL SERVICE CENTER INSTITUTE
540-G Terminal Tower, Cleveland 13, Ohio

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WE'VE BECOME THE BIGGEST IN

welcomed "little" jobs, too–

THE INVESTMENT CASTING FIELD...

...and it makes good sense both for Arwood and its customers

No investment casting job has ever been or ever will be too small for us.

We don't have any "sidelines" nor is investment casting only a sideline with us. It is the "be-all and end-all" of our economic existence.

AS A RESULT: anybody–and we mean precisely that–*anybody* who suspects, thinks, feels or believes that an investment casting will help him solve a design or production problem gets the unqualified, undivided attention of the top talent we have to offer–from the trained field engineer in his territory, our design engineers, our estimating staff, our tooling men, and our production specialists. No one of these groups cares whether your order is for 50 parts or 100,000. If they accept the order, they want it handled to or above "specs"–preferably above.

Why? Simply because these men are dedicated to producing the finest that the investment casting process can deliver in any design, in any castable alloy (we cast any that can be), and in prototype quantities so small that it might surprise you.

This attitude of theirs is far from philanthropic. From an accountant's eye view, they realize full well that your "little ones" may soon grow up and become big ones.

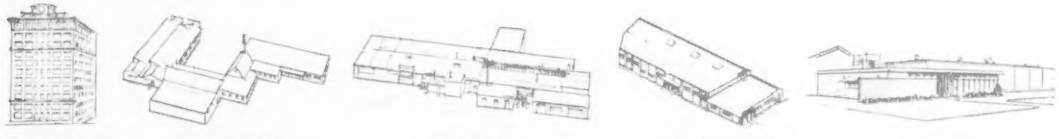
And when they do, Arwood is ready . . . more so than any other investment caster. In fact, we can take in stride all the volume that's required. Our five plants, extending from coast to coast, each with its own research, tooling, quality control and production facilities, can handle the biggest job you can offer.

In short, once the prototype or experimental phase is completed, Arwood can give you the quantity production you need, *and* deliver it when you need it.

What more can we say? We can only sum it up by saying this – If you have a "difficult" part remember this: most "difficult" components, no matter what the alloy or quantity, might well be produced as an Arwood investment casting . . . and the cost is often extremely low, compared with conventional methods.

On the other hand, if we can't do it–and do it economically – we'll be the first to tell you so – immediately. We'd rather lose an order than a customer. As you can count on Arwood, you can count on that. Try us and see.

ARE YOU *REALLY* UP-TO-DATE ON WHAT INVESTMENT CASTING CAN DO? A lot of over-optimistic information has been disseminated in the past. Our 48-page "Practical Guide" gives forthright answers on what to expect, and, equally important, what *not* to expect. It tells how to save money by designing for the process, and also gives complete tables on the properties of castable alloys. It's yours for the asking.



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Machine the simple . . . cast the complex

A complete service from design through tooling, production and finish machining. Seventy-one engineering representatives from coast to coast.

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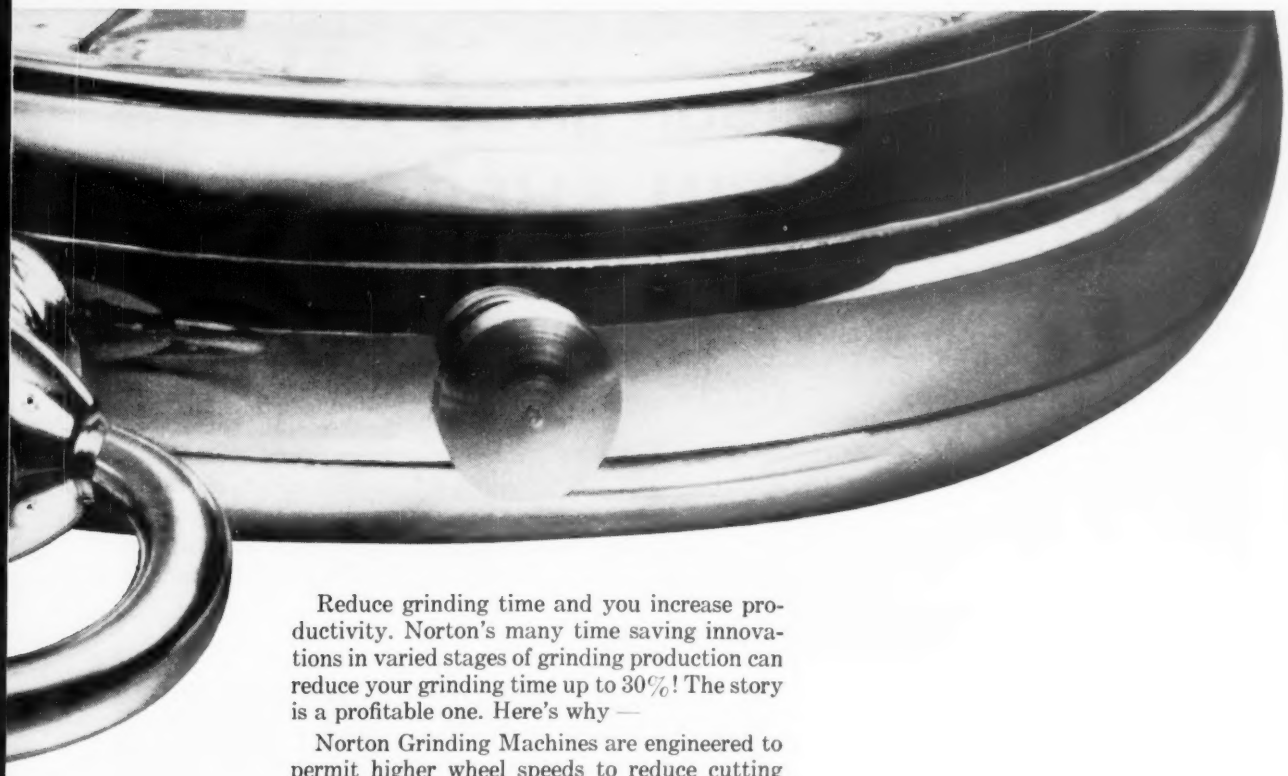
Time is the measure of productivity



Reduce grinding time and you increase productivity. Norton's many time saving innovations in varied stages of grinding production can reduce your grinding time up to 30%! The story is a profitable one. Here's why —

Norton Grinding Machines are engineered to permit higher wheel speeds to reduce cutting time. Norton's *Automatic Wheel Balancer* balances the wheel in *five seconds — on the machine.* You reduce time spent "grinding air" up to 85% because of Norton's *Automatic Wheel Contact Accelerator* which speeds the wheel to the work and compensates for work piece-diameter variation. Another advance is Norton's *Automatic Truing* which eliminates work interruptions and the *Automatic Wheel Wear Compensator* that stabilizes the grinding cycle.

Norton Grinders further add to your productivity by minimizing work spoilage with *Automatic In-Process Gaging.* In the case of surface grinders Norton *Higher Table Speed of 150 fpm* actually reduces grinding time up to 50%.

These are only some of the many reasons you can increase your productivity with Norton Grinders. They also offer accessories that literally transfer skills to machines — *ultra-fine feed,* and *automatic features* such as *steady resting, endwise locating, loading, constant peripheral wheel speed* and *hydraulically-operated feed screws* provide this competitive advantage.

The decision is yours — can you afford not to reduce the time it takes to produce your product? Can you afford not to increase your productivity? Contact your Norton man, NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. In Canada: J. H. Ryder Machinery Co. Ltd., Toronto 5.

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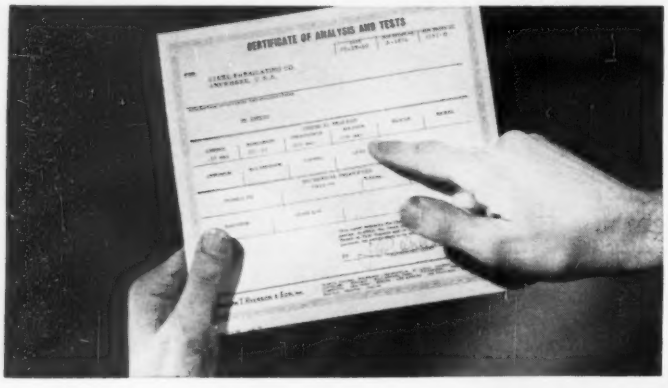
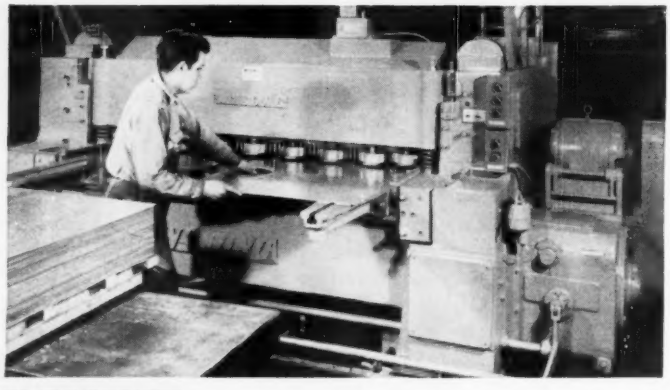
MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines

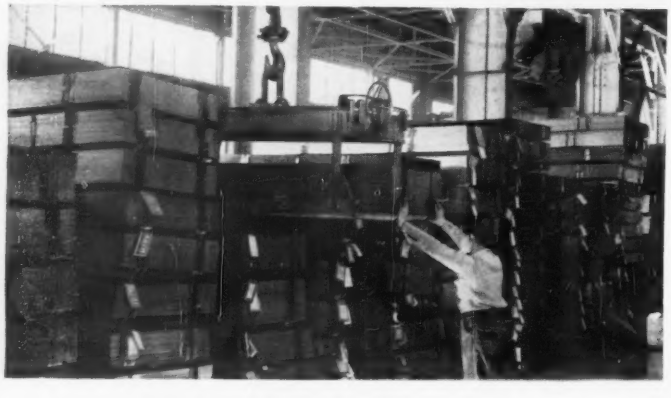
How Ryerson gives you EXTRA VALUE IN SHEET STEEL



Carbon control—Did you know that Ryerson can furnish a conformance report, if requested when your order is placed, certifying that hot or cold rolled low carbon sheets in stock sizes are SAE 1008 with maximum carbon content of .10? This means you can minimize or eliminate problems of variation in formability and weldability.

Closest cutting tolerances—Our standard "aim" tolerances are the closest in the industry. For example, on shearing of sheets: width or length tolerance—under 48″, -1/32″; 48″ and over, -1/16″. These limits can be guaranteed upon specific request, given in advance of processing your order.





Fast, dependable service—Hundreds of customers often cite these two major reasons for ordering from Ryerson: absolute confidence in "dependability of service as promised," and speed of service to meet their most critical requirements.

Whatever your sheet and strip requirements, a Ryerson specialist is ready to consult with you. A phone call is all it takes.

RYERSON METALOGICS

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Cresap Asks for Industry Code of Ethics

Mark Cresap Jr., president, Westinghouse Electric Corp., has asked the National Electrical Manufacturers Association to propose a code of ethics for the electrical equipment industry. He said "the basic problem goes beyond the confines of any one company" and "no one enterprise can solve it to the ultimate satisfaction of the public." He did cite steps Westinghouse has taken: Establishment of a new antitrust section in the law department, explanation of the law to 3000 managers—disciplinary penalties, an audit system, and quarterly reports on enforcement.

Justice Files Six More Suits

The Justice Department has filed six more damage suits in Philadelphia involving 18 electrical equipment makers. Attorney General Kennedy said the claimed damages would "run into the millions of dollars." General Electric and Westinghouse were named as defendants in all six cases. Allis-Chalmers was named defendant in four suits and co-conspirator in another. I-T-E Circuit Breaker was named in three suits. Also named were Federal Pacific Electric, McGraw-Edison, Wagner Electric, Moloney Electric, Cutler-Hammer, Square D, and Kuhlman Electric. Seven other firms were named co-conspirators but not defendants.

Aluminum Sets Its Sights on the Bridge Market

Kaiser Aluminum & Chemical Corp. is marketing a new type highway bridge that uses aluminum cellular components. The first two will be erected in Amityville, N. Y., this summer. Kaiser says the original price is competitive with conventional steel bridges in spans of 75 ft or more. It says tests have established that the bridges will withstand more than 100 years of normal service. Triangular shaped beams are bolted together edge-to-edge to form the roadway base. Each beam is a "cell" fabricated from an aluminum sheet and stiffened inside with aluminum extrusions. Standard concrete facing is poured directly on the deck.

Job Security Will Be UAW's Prime Aim

Job security will be the prime aim of the United Auto Workers in this year's contract talks, Walter Reuther told a caucus of UAW local leaders. He

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indicated that the union would press for increases in the amount and duration of SUB as well as more lenient severance pay provisions. Mr. Reuther emphasized that the union would attempt to remain flexible in its demands to avoid a strike on issues which would not have rank and file support.

Hanley Wants $50 Billion Change in Attitude

"A simple change of attitude—without the addition of one nickel's worth of new equipment—could raise U. S. productivity enough to bring about a $50 billion annual increase in output." That's what E. J. Hanley, president, Allegheny Ludlum Steel Corp., told a Duquesne University group. He said that wages don't necessarily have to rise with productivity, as is so often mistakenly advocated. "The benefits of increased productivity are spread more fairly by price reductions than by wage increases," he noted.

Eaton Workers Vote Selves Out of Job

For the second time in two weeks, one of two union locals at Eaton Mfg. Co.'s Reliance Div., Massillon, Ohio, rejected a company proposal to cut wages 16 cents an hour. The proposal was made as an alternative to moving the two plants to a more advantageous location. The second vote came after union members petitioned for a secret ballot.

Chrysler Charged with Antitrust Violation

On top of other recent troubles, Chrysler Corp. has been charged with violating the federal antitrust laws. The Justice Department has filed a civil antitrust suit in Ft. Wayne, Ind., accusing Chrysler of applying "illegal pressure" on its dealers to force them to stop handling Studebaker-Packard cars. A Chrysler spokesman denied that the firm used "illegal pressure" against dealers. He said that Chrysler co-operated with the department in its investigation.

Space Reactor Tested Successfully

A small (200 lb), prototype reactor to generate heat that will be converted to electricity to power auxiliary equipment aboard spacecraft has "achieved criticality" (sustained chain reaction), reports Atomics International, a division of North American Aviation Inc., which designed and built the unit. It's part of the Atomic Energy Commission's Snap 2 program. The reactor core generates 50 kilowatts of heat, which is converted by a tiny turbine into 3 kilowatts of electricity.

Coming: Spectacular Construction Growth

By the end of this century, we will have to build the equivalent of all homes and buildings that now exist in the U. S., John P. Jansson, manager of market development, Metals Div., Olin Mathieson Chemical Corp., told the Metal Curtain Wall Clinic in New York last week. He said that building activity in the next ten years would be at least 50 per cent above that of the 1950-60

decade. "This expansion will have a tremendous impact on metal curtain wall construction which is now almost a trademark of U. S. architecture and is widely utilized abroad," he predicted.

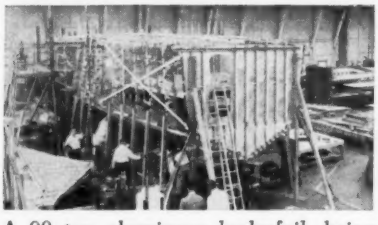
Indiana Will Build Seaport, Federal Aid or No

Indiana will go ahead with plans to build an $80 million seaport on Lake Michigan whether the federal government agrees to participate or not, Gov. Matthew Welsh asserts. The federal government was expected to dredge the harbor and build the breakwater (estimated to cost $35.5 million) and contribute $100,000 annually for maintenance. That still might happen, though action has been delayed, partially as a result of Sen. Paul Douglas' (D., Ill.) ardor to create a national park in the Ogden Dunes area where the seaport is to be built. A public hearing will be held May 3 and 4 in Indianapolis to consider alternate sites for the port, although James Fleming, chairman, Indiana Port Commission, acknowledged that the Burns Ditch area (in the Dunes) was the most likely spot.

Products of Tomorrow

The American Iron & Steel Institute suggests that these ideas may become the steel products of tomorrow: An electronically controlled overhead cab for production line supervision; an automatic monorail service through shopping centers; supermarkets operated by punch cards; a centralized air conditioning plant for an entire community; an all-steel cantilever home; a one-piece bicycle frame; and a one-piece stainless steel rim wheel combination for autos.

Big Hydrofoil to Be Launched in June



A 90 ton aluminum hydrofoil, being built by Grumman Engineering Corp., will be launched at Bethpage, N. Y., in June. The 104-ft-long craft will have a top speed of 90 miles per hour and will cruise the ocean at 70 miles per hour, riding above the surface on three submerged "wings." The U. S. Maritime Administration will own and operate the vessel. It's built of Alcoa's alloy 5456. All-welded construction is used.

Will Copper Price Rise?

Coppermen are reluctant to predict a price hike, but they say odds seem to favor the move. U. S. demand is up; sales rose in February and March and April looks even better. Demand from overseas has been heavy. And the European price is on a par with the prevailing U. S. quotation (29 cents a pound).

GM Indicted on Monopoly Charge

General Motors Corp. was indicted by a federal grand jury in New York Apr. 12 on charges of using its "vast economic power illegally" to monopolize the diesel locomotive manufacturing industry. The criminal charge

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The Metalworking Weekly

April 17, 1961 Vol. 148 No. 16

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asserted that GM captured more than 84 per cent of the locomotive market during a period in which two competitors were driven from the field. From 1946 to 1959, it was stated, GM made an average profit, before taxes, of 20.2 per cent, while its leading competitor, Alco Products Inc., averaged only a 1.9 per cent pretax profit. The indictment cited 14 ways in which GM allegedly misused its economic power to force most of the nation's 40 major railroads to purchase locomotives from GM's Electro-Motive Div.

How Five Economists See '62 Business Pace

Here's what five bank economists predicted at the annual forecast session of the Cleveland Society of Security Analysts:

Predicting Economist	Industrial Production (1st qtr, 1962) (Index: 1957=100)	Gross National Product (1st qtr, 1962, annual rate, billions)	Steel Ingot Output (1961, millions of tons)	Auto Output (1961, millions of units)	Corporate Pretax Profits (1st qtr, 1962, vs. 1st qtr, 1961)
Robert Richards Union Bank of Commerce	123	$530	95	5.8	+20%
Russell Metzner Central National Bank of Cleveland	114	$534	97	5.6	+27%
James Dawson National City Bank of Cleveland	115	$540	100	5.6	+25%
David Elliott Cleveland Trust Co.	115	$530	98	5.7	+27%
Loren Whittington Society National Bank of Cleveland	112	$530	102	5.9	+20%

Prefab Homes Widen Their Market Share

In 1960, for the eighth straight year, manufactured homes widened their share of the single dwelling market—to 13.13 per cent, reports Home Manufacturers Association. An estimated 450 manufacturers built 126,867 units. HMA estimates that 140,000 factory built units will be erected this year. It says new companies are entering the growth industry at the rate of about one per week in the U. S. and Canada. Ohio had the most prefab home starts last year (16,017), followed by Pennsylvania (9821) and Illinois (8926).

Straws in the Wind

John Dykstra, 63, former vice president-manufacturing, has been named president of Ford Motor Co. He succeeds Henry Ford II, who took over temporarily after Robert McNamara resigned to become secretary of defense . . . Ernest E. Thum, 76, director of editorial services for the American Society for Metals, died suddenly Apr. 10. He was editor in chief of *Metal Progress*, ASM's monthly magazine since 1958 and was its first editor. He also authored several technical books . . . Steel industry employment rose in February . . . West Germany produced 3,075,686 tons of steel in March vs. 2,789,338 tons in February . . . The Commerce Department reports that seasonally adjusted retail sales rose in March for the second consecutive month . . . Aluminum Co. of America has decided to re-enter the aluminum foil business . . . U. S. shipments of aluminum foil this year will rise 7 million lb to 255 million lb, predicts Robert H. Lucas of Kaiser Aluminum & Chemical Sales Inc. . . . Interest rates on Small Business Administration loans to small firms and to local and state development companies in areas of substantial labor surplus have been lowered to 4 per cent . . . The Export-Import Bank of Washington has agreed to loan $6.4 million to Pakistan for the purchase of U. S. cotton processing machinery . . . Westinghouse Electric Corp. has introduced an ultraviolet light system to combat airborne bacteria.

HOW TO HOLD A CUP OF HELLFIRE

Gently, friend. We're pouring a cup of molten iron from a man-made volcano. No slips twixt cup and lip, please. And now the pouring ladle must be moved to the mold and its contents emptied. A touchy problem in material handling? Yes, a delicate problem. Yet this is the daily activity of foundries and mills throughout America—the daily work of Whiting cranes and materials handling systems.

If you have to move materials—in shop or mill, dock or warehouse—move it at low cost, dependably and safely, call on Whiting. There are specialists here who can talk your language.

The facts on "How to Select an Overhead Traveling Crane" are yours for the asking. Ask for Bulletin 79. Write *Whiting Corporation, 15643 Lathrop Ave., Harvey, Illinois.* In Canada: *Whiting Corporation (Canada) Ltd., 350 Alexander Street, Welland, Ontario, Canada.*

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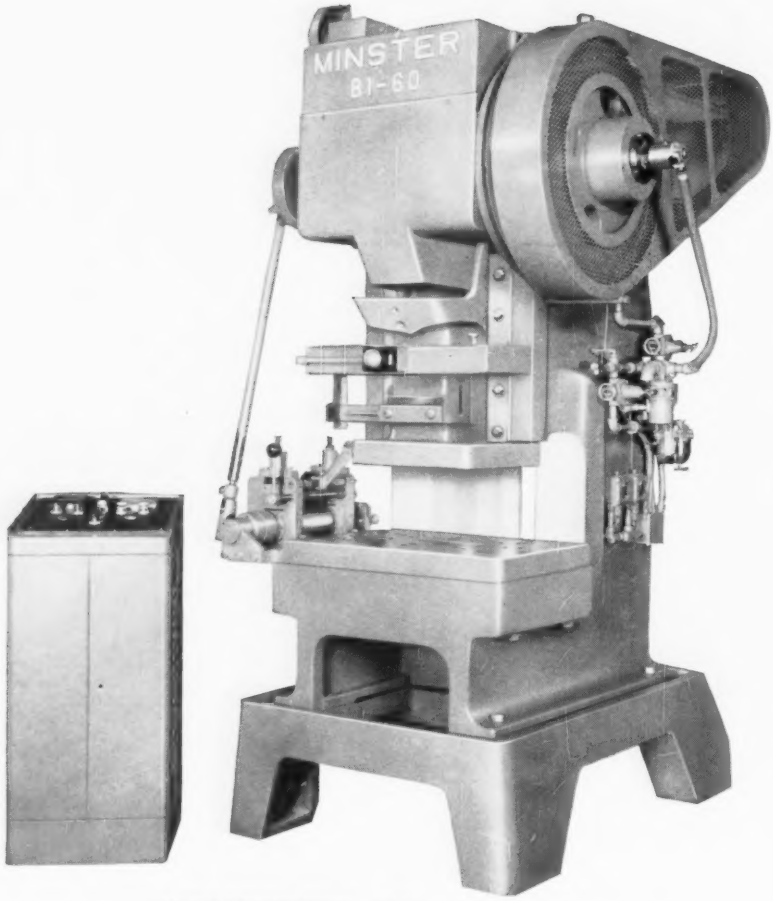
If you make small parts in large volume.... this B1 press probably will make them faster, more accurately and at lower cost per part.



CONSIDER IT!

Improvements in tooling and production technology have led to higher speeds, more intricate dies and multi-stage operations. Minster anticipated the industry's need for a press specifically designed for high speed, small parts stamping. We were best prepared to develop such a press. Minster B1 presses have greater stability, precision and rigidity to do the job. Capacity range is 16 to 60 tons . . . proper feed equipment available to match your job. Ask a Minster representative to show you why a B1 press is superior.

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MINSTER®

Adjustable From 1 to 15 Seconds

This new Allen-Bradley development should solve such occasional problems where, upon the operation of the push button or limit switch, a slight time delay should occur. Time delay is adjustable up to 15 seconds—and it can also be introduced when "stopping" the operation—but not in both the "starting" and "stopping" cycle.

Both push-button and limit switch are relatively low in cost—ideal for applications where a delay of only a few seconds is desired, and where the repetitive accuracy of the Allen-Bradley Bulletin 849 time delay relay is not necessary. Both units have single pole, double break contacts—either normally open or normally closed. They are no more difficult to install than the corresponding units without the time delay feature.

Machine tool and production system designers should have full information in their files on these new Allen-Bradley time delay push buttons and limit switches. It is yours for the asking. Write today.

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Diamonds machine ceramic parts

Diamonds polish dies for plastic dinnerware

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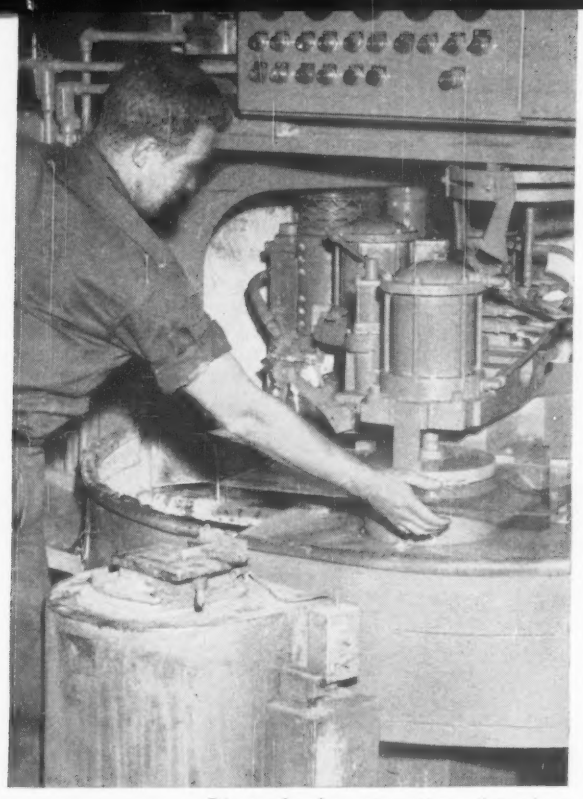
These pictures prove the versatility of diamonds, too. Look at the different *kinds*

Diamonds remove bumps from concrete runways and highways



Diamonds edge automotive safety glass

of jobs they can do—everything from polishing the sensitively controlled dies that shape plastic dinnerware to shaving the bumps from a concrete jet runway.

If you cut, sharpen or smooth in your business, you can probably use diamonds to advantage. Next time you buy wheels or tools, ask for diamonds. Test them against the method you're now using. You'll find out how economical a diamond can be.

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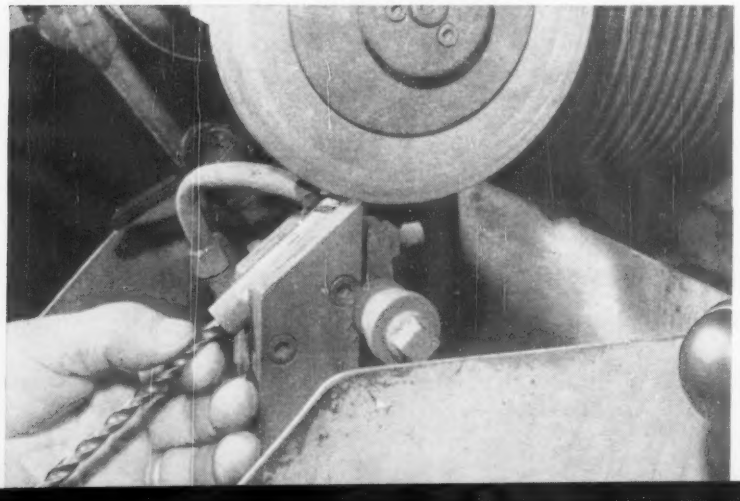
Diamonds grind chip-control splits in crankshaft drill



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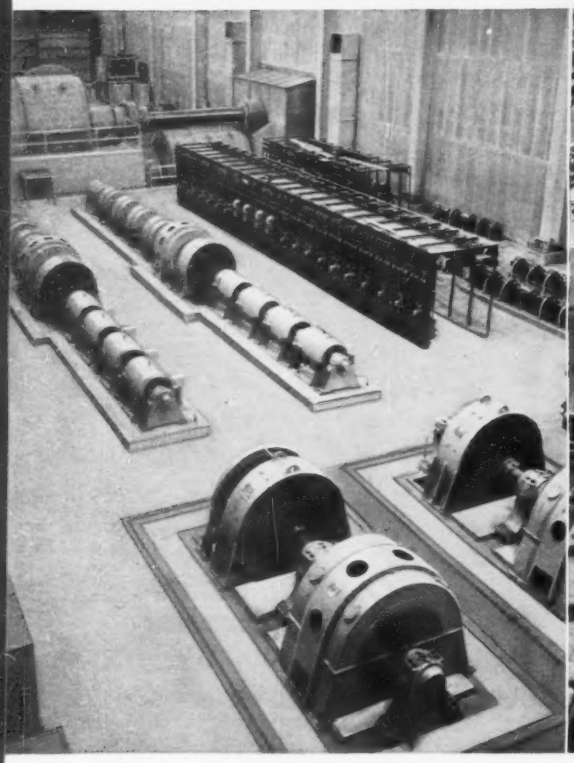
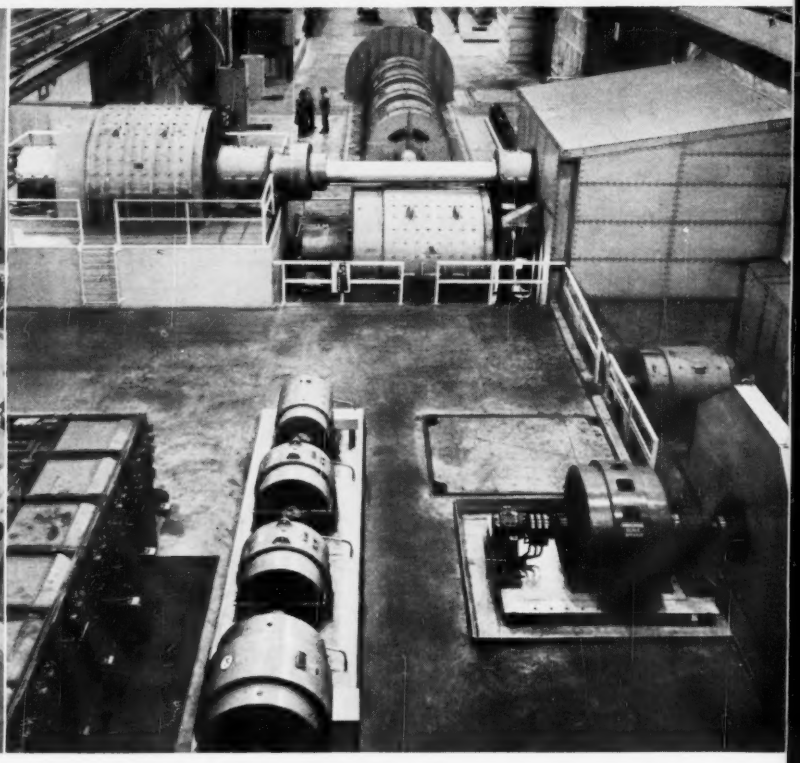
Power for Steel





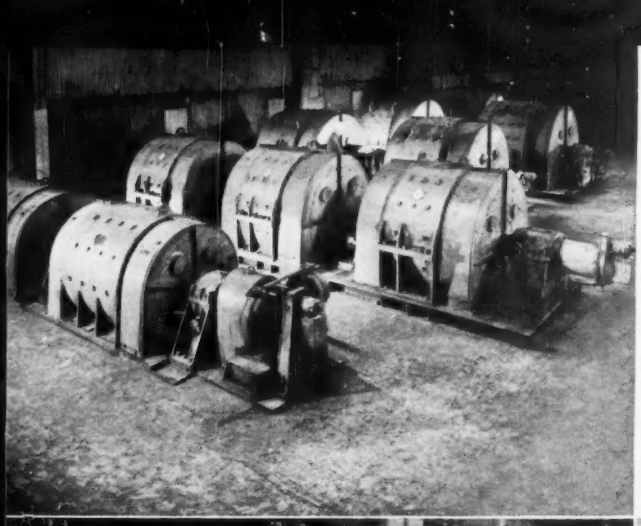
Allis-Chalmers power serves blooming mill: Installed in 1953, the 45-in. by 115-in. blooming mill at Granite City Steel operates as a high-lift slabbing mill. It's powered with an Allis-Chalmers 10,000-hp twin drive, 40/80-rpm reversing motor. Additional A-C equipment includes switchgear, direct-current control, constant and variable-voltage m-g sets, and REGULEX exciter sets.

Hot strip mill upgraded: Granite City Steel's hot strip mill has been continuously upgraded to increase tonnage and quality. A four-stand finishing train, installed in 1936, was upgraded in 1941 with the addition of a fifth finishing stand. In 1952, a three-high rougher was replaced with a four-high reversing rougher — horsepower was increased from 3000 hp to 7000 hp plus a 1000-hp edger. Horsepower of the finishing train was later increased by raising bus voltage from 600 to 650 volts. Now, an Allis-Chalmers feedback automatic gage control is being installed to increase quality of strip.

Throughout the mills at Granite City Steel are numerous examples of Allis-Chalmers leadership and experience in power for steel. A-C equipment is used in virtually all operations—rolling mills, processing lines, sintering plant, and power plant. All demonstrate the extra value that is standard with A-C products, systems and services. Allis-Chalmers can also help you serve tomorrow's changing markets profitably. See your A-C representative or write directly to Allis-Chalmers, Industries Group, Milwaukee 1, Wisconsin.

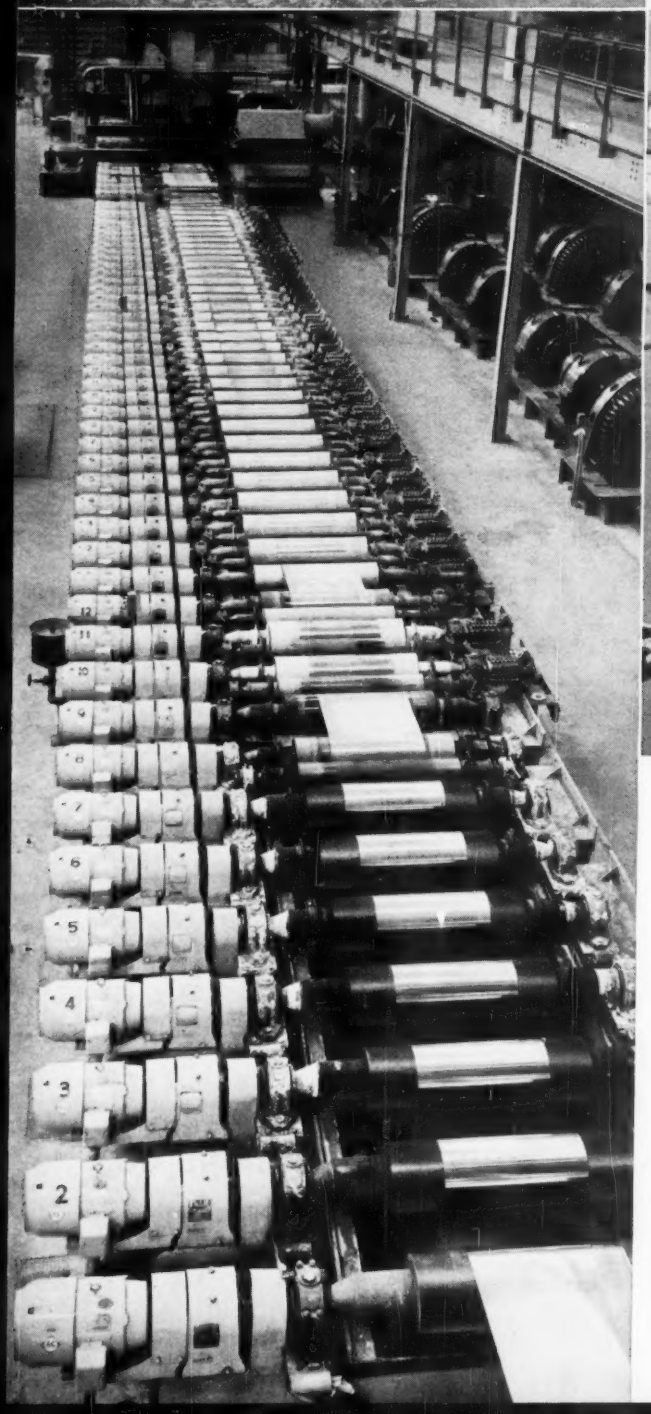
A-1454

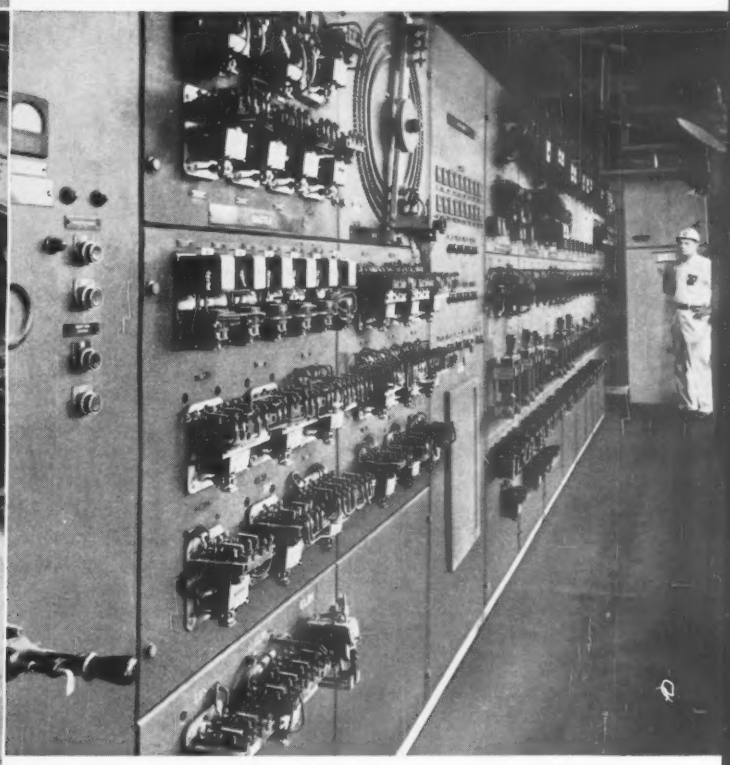
Regulex is an Allis-Chalmers trademark.



A-C cooperation limits "changeover" downtime: In 1958, Granite City Steel's four-stand cold strip mill was modernized to increase sheet-gage tonnages by 35%. Downtime for the changeover (from 9600 hp at 2800 fpm to 18,700 hp at 3600 fpm) was three weeks. A-C installed motors, m-g sets and 400-cycle control. Now being constructed are the motors, control, and a feedback automatic gage control for a new 40-in. Sendzimir mill.

Allis-Chalmers powers shearing line: Allis-Chalmers direct-current adjustable-voltage control and direct-current drives provide accurate shearing of sheets at speeds up to 1000 feet per minute. A magnetic piler, incorporated in this line, assures careful handling of sheets.

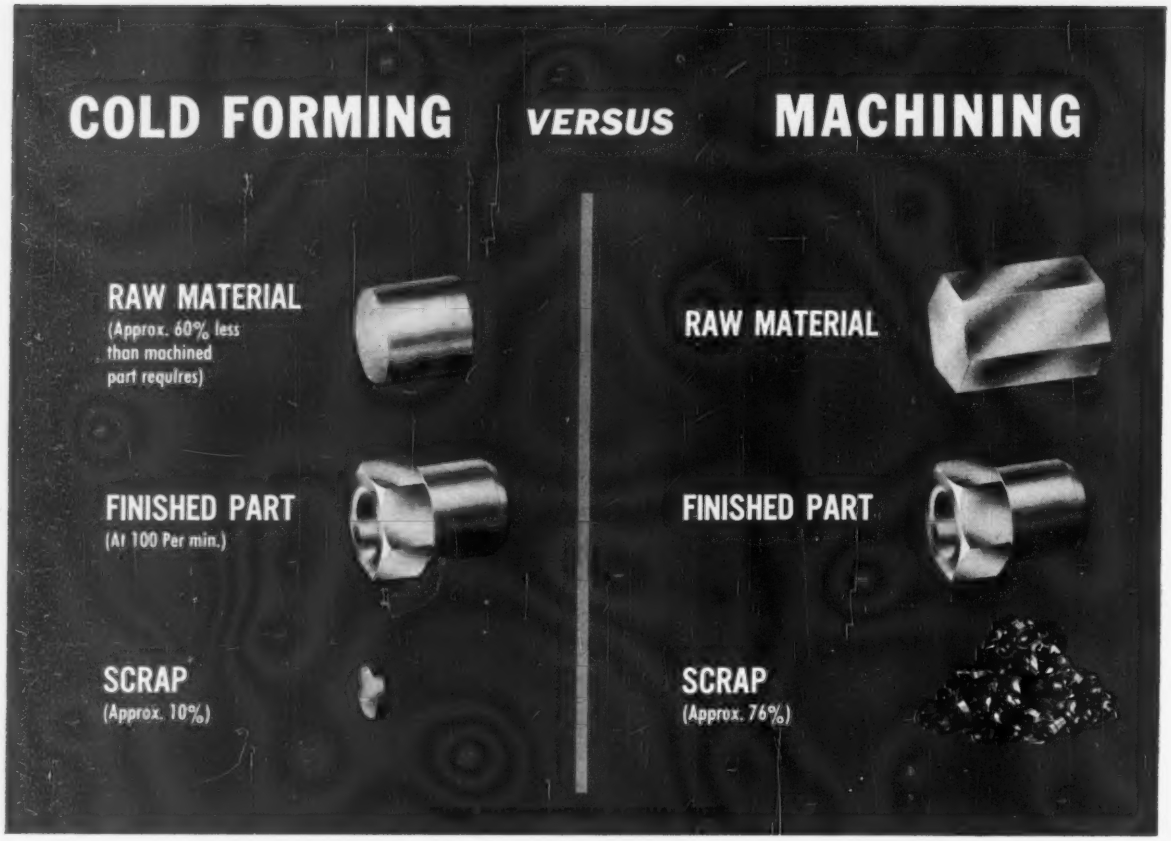




Sixty-eight motors power plating rolls: When this electrolytic tinning line went into operation in 1960, sixty-eight 5-hp Allis-Chalmers totally enclosed, fan-cooled dc gearmotors powered the plating rolls. Additional Allis-Chalmers motors and supporting motor-generator sets provide power throughout the line. Allis-Chalmers motors and supporting variable-voltage motor-generator sets also serve a high-speed continuous annealing line at Granite City Steel Company.

ALLIS-CHALMERS PRODUCTS FOR THE STEEL INDUSTRY: Allis-Chalmers serves the steel industry with motors, m-g sets, engine-generator sets, controls, rectifiers, switchgear, transformers, circuit breakers, steam turbine generators, condensers, compressors, pumps, materials handling equipment, crushers, grinding mills, kilns and screens.

ALLIS-CHALMERS



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WATERBURY FARREL PARTS FORMERS

Important economies in the production of a wide variety of parts are resulting from the use of Waterbury Farrel Parts Formers. Advantages include: savings in raw material, higher output and improved physical properties in the finished part.

Through the combination of cold heading and cold extrusion, these machines automatically form dimensionally accurate parts, from ferrous and non-ferrous wire or rod, at 45 to 100 pieces per minute. Typical operations include forward and backward extrusion, forming, reforming, upsetting, drawing, flanging, chamfering and top or bottom piercing. In many cases, the parts are finished—no secondary operations required.

Investigate this modern cost-cutting production method by letting us analyze your drawings or samples.

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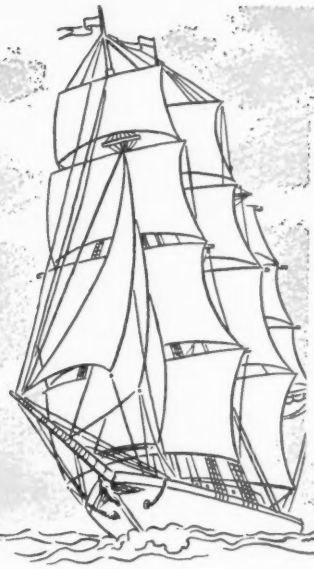
WF-74

Why Rust-Oleum is different—

and what this difference, backed by 35 years of industry proof, means to you!



A Sea Captain developed it . . . Industry proved it!

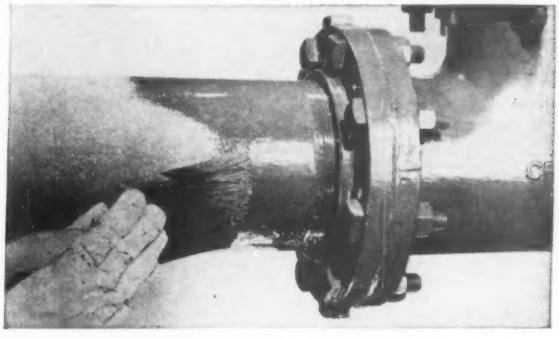
The original Rust-Oleum formula was developed nearly fifty years ago by Sea Captain Robert Fergusson, who became intrigued with the rust-stopping qualities of fish oil early in his career. Creating a *special treatment* for the fish oil, he used the *specially-processed fish oil* as the vehicle in combination with fine rust-inhibiting pigments. The result? A coating that actually *stopped rust* when applied directly over sound rusted surfaces, after scraping and wirebrushing to remove rust scale and loose rust. Possible, because the *specially-processed* fish oil penetrated the rust to bare metal. This was the birth of Rust-Oleum's *exclusive* 769 Damp-Proof Red Primer.

PROVED THROUGHOUT INDUSTRY FOR OVER 35 YEARS

Today, Rust-Oleum in its many systems and colors, has been proved throughout industry for over thirty-five years. This proof by leading industrial users is your assurance of savings in time, money, and metal. Economies made possible by the fact that Rust-Oleum 769 Damp-Proof Red Primer goes right over the sound rusted metal—usually eliminating costly surface preparations. And Rust-Oleum, in its various systems, resists rain, sun, fumes, heat, weathering, chemicals, etc., for lasting beauty over the years.

RUST-OLEUM NEW COLOR HORIZONS SYSTEM

The Rust-Oleum New Color Horizons System introduces a new coating concept to industry. It combines four important factors: (1) the ability to stop rust, (2) smart, modern color harmony, (3) the durability to last and last, (4) ease of application that saves time, money, and metal. See how this system can bring lasting beauty to your plant, machinery, equipment, pipes, tanks, structural steel, fences, etc. Write for complete information or contact your nearby Rust-Oleum Industrial Distributor. He maintains complete stocks for prompt service.



RUST-OLEUM®

There are imitations, but only *one* Rust-Oleum. It is distinctive as your own fingerprint.

STOPS RUST!®

ATTACH TO YOUR LETTERHEAD

Rust-Oleum Corporation
2597 Oakton St., Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ New Color Horizons Systems Catalog featuring 110 actual color standards and 69 photo applications.
- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer to be applied over sound rusted surface.
- ☐ Results of radioactive tracing study on Rust-Oleum fish oil penetration.

ENGINEERED PACKINGS
for Steel Mills

Through positive sealing, Garlock CHEVRON* Packings make a big difference in efficiency of hydraulic-pneumatic equipment in steel mills.

Wherever fluid power is used in steel producing, apply Garlock CHEVRON Packings to increase equipment efficiency.

On rams, plungers and reciprocating-rod applications of all types, CHEVRON Packings seal tight against loss of hydraulic fluids and pressure. Friction and wear, too, are minimized with CHEVRON Packings on the job.

Last much longer, need less maintenance than ordinary V-type packings. Garlock CHEVRON Packings have an exclusive hinge-like construction. As pressures increase, the packing rings tighten to prevent leakage. When pressures decline, the rings ease off to permit free operation of the rod, ram, or piston without leakage. CHEVRON packing rings provide adequate heel clearance for easy installation. Once installed, further gland adjustment is rarely, if ever, necessary to compensate for pressure changes. Garlock CHEVRON Packings work very efficiently in shallow stuffing boxes. Apply them against water, steam, oil, gases and chemicals in temperatures to 600°F.

For hydraulic-pneumatic service of all types, Garlock offers a complete line of products . . . **Garlock "O" Rings** for static and dynamic applications . . . **Garlock Chevron Rings** for rod and stuffing box seals on reciprocating applications . . . **Garlock Cup Packings** for hydraulic-pneumatic, low-friction service.

Find out more about the various materials and sizes of Garlock Hydraulic-Pneumatic Packings. Call your Garlock representative at the nearest of the 26 Garlock sales offices and warehouses throughout the U.S. and Canada. Or, write for Catalog AD-115 (CHEVRON Packings), AD-148 ("O" Rings), and AD-145 (Cups). Garlock Inc., Palmyra, N.Y.

GARLOCK

Canadian Div.: Garlock of Canada Ltd.

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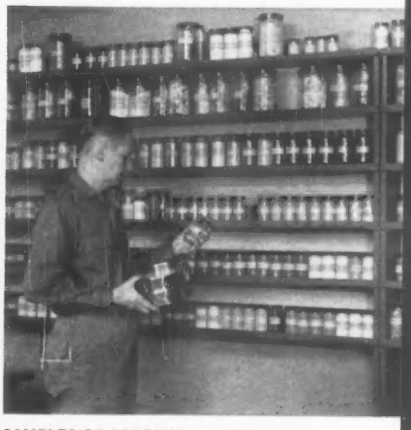
FABRICATED SCREEN SECTIONS TO FIT EVERY VIBRATING SCREEN MADE

Tyler fabricates screen sections to fit every existing type of vibrating screen. This aggregate cloth is drawn from inventory, quickly fabricated to give you fast delivery. Tyler-developed hook strips maintain drum-head tension for long service life.



SAMPLES OF SCREENED MATERIALS MAY ANSWER YOUR SEPARATING PROBLEMS

The Tyler Customer Service Laboratory keeps on file data and samples from years of evaluating screening problems. When you have a new application, check Tyler for technical recommendations based on experience and thorough evaluation.

Wire cloth so finely woven it screens out light!

Openings in this woven wire cloth are so tiny they're specified in microns—millionths of an inch. This is Tyler stainless steel wire cloth, 325 x 2300 mesh, used in filtering fuel in aircraft engines. Whatever your special needs in wire cloth, Tyler can supply you from the world's broadest line—covering thousands of different specifications.

TYLER CUTS YOUR COST OF SCREENING

• Requirements matched from world's broadest line of wire cloth • Fast shipments from the industry's largest inventory • Technical service backed by unique Customer Service Laboratory.

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Brand new from top to bottom . . .

Ultrasil

a major advance in design, construction and performance of silicon rectifiers!

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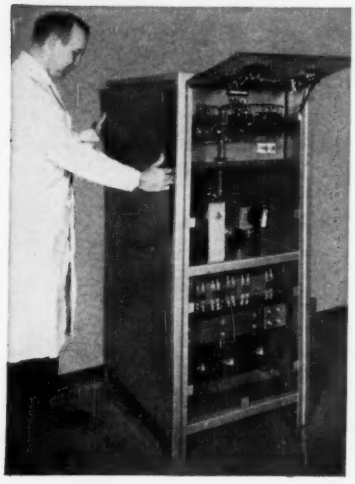
Udylite

WORLD'S LARGEST PLATING SUPPLIER

NEW OVERALL FUNCTIONAL DESIGN

Centralized A.C. Control—The new Ultrasil Rectifiers feature a front-mounted, hinged door for fast easy access to all meters, push buttons and A.C. control equipment. This convenient, compact control center is built into the rectifier itself.



Self-locking, Slide-in Panels and Hinged Inspection Doors—Ultrasil's front, side and rear panels are easily removed for inspection and maintenance. Hinged doors, both front and rear, provide a quick means of inspecting the control equipment, fan and heat sink assemblies.

Trim Appearance, Lasting Finish—Clean styling, two-tone color and chrome trim bring the modern look to plating equipment. Rust-resistant enamel with a bonding primer offers a superior protective coating under all plating conditions.

Uniframe Construction—One-piece welded frame gives increased rectifier ruggedness, reduces overall weight.

Ultrasil Ultrasil Ultrasil Ultrasil Ultrasil Ultrasil

❶ NEW TRANSFORMER DESIGN

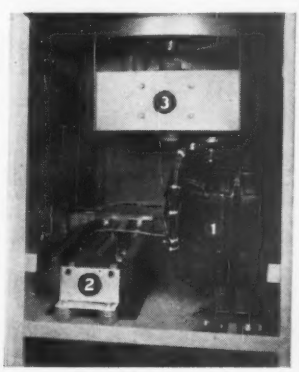
Featuring proven *Balanced Power* design, Ultrasil Transformers eliminate diode matching and balancing reactors. Top quality silicon transformer steel, improved varnish coating, silver soldered electrical connections with the elimination of mechanical connections are but a few of the many new features. Transformers are conservatively rated, have Class B insulation and are designed for optimum ventilation.

❷ NEW DIODE ASSEMBLY DESIGN

New, one-piece, solid copper finned heat sink assembly provides peak cooling efficiency, requires less room, is easily accessible. Improved Silicon Diodes have new ceramic insulation. Soldered seals have been eliminated. Flexible connectors feature increased capacity.

❸ NEW VENTILATION SYSTEM

The new fan housing assembly of the Ultrasil coupled with new permanent, built-in baffling assures highest ventilation efficiency.



NEW PROTECTIVE DEVICES

New thermostatic trips give positive protection against diode overheating from any cause. D.C. protective device guards against excessive overload and short circuit conditions. Each diode is protected by a readily accessible fuse.

Ultrasil Rectifiers are available in capacities from 500 to 8,000 amperes, and from 6 to 24 volts; additional capacities, on request. Integral, remote and automatic controls are available. Call your Udylite representative. Or, write:

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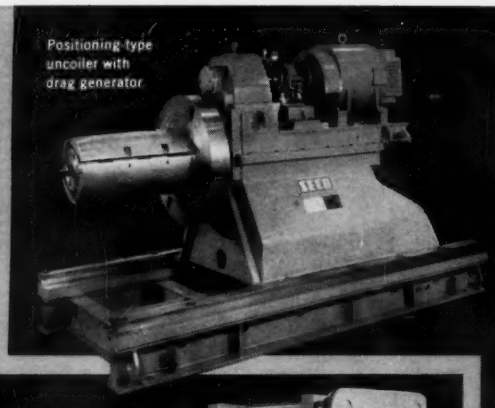
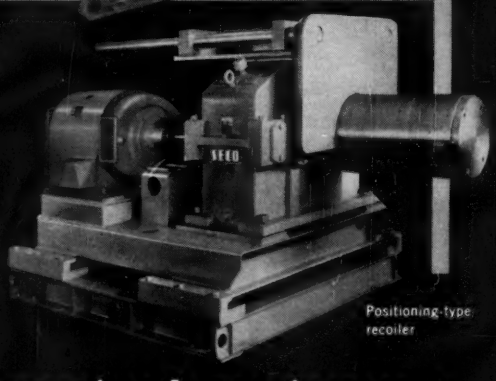


Predictable Performance

for processing lines with

SECO

terminal equipment

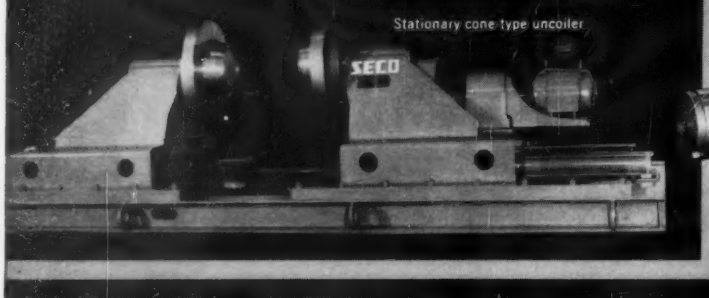


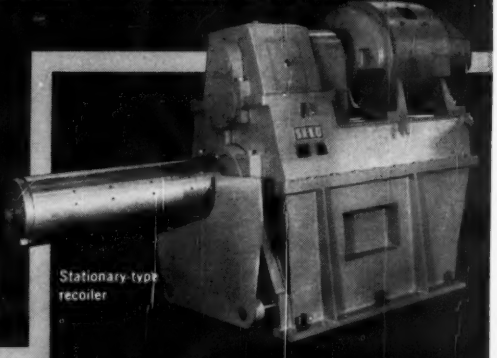
From entry to exit, new and modernized processing lines . . . annealing, pickling and others . . . perform better with SECO terminal equipment. This equipment handles coils ranging from 10,000 to 50,000 pounds with speed, convenience, safety.

SECO uncoilers and recoilers are designed to operate at any speed the mill requires, are available in positioning or stationary types. The positioning types feature a slideable reel base mounted on a sub-base for alignment with the processing line, actuated by an automatic edge control.

SECO also makes auxiliary equipment such as coil cars with coil lifts to simplify uncoiler loading and recoiler unloading. Available for mandrel or cone-type reels.

A staff of trained sales engineers will assist you in finding the equipment best suited to your needs. Call or write today. West Coast representative: United Machine Tool Company, Los Angeles.





SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Slitting Lines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Bailers

STEEL EQUIPMENT COMPANY

P. O. BOX 737, WARRENSVILLE STATION • CLEVELAND 22, OHIO

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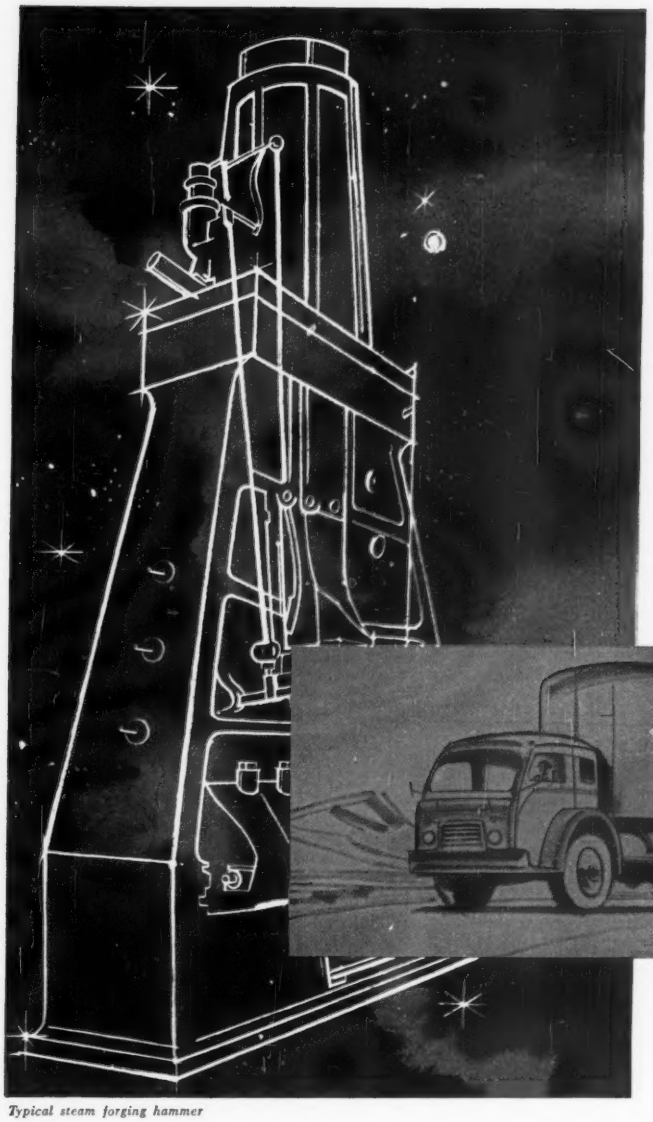
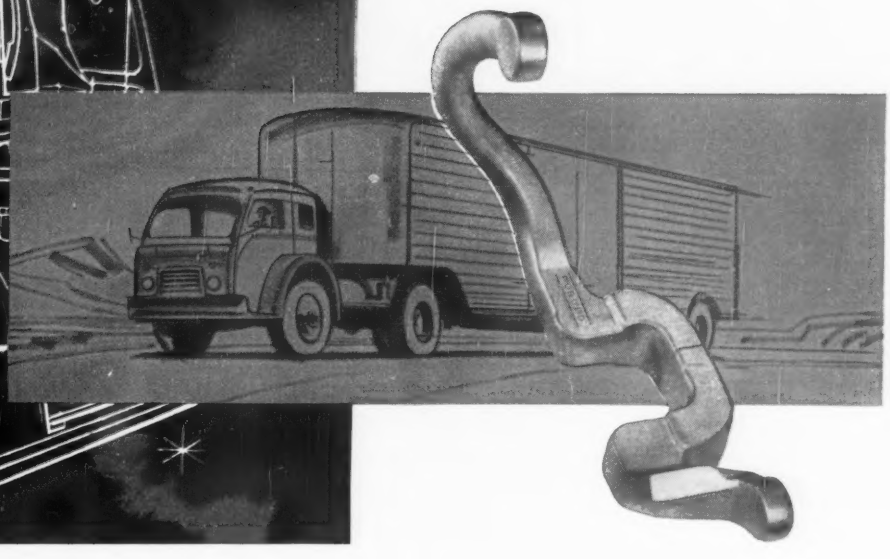


Typical steam forging hammer

REQUIRED SAFETY FACTORS in steering arm assured by designing it to be forged



By designing with forgings, a truck manufacturer can count on the required safety factors, with minimum "beefing-up" of parts to offset unknown internal structures or non-homogenious materials.

You, too, can achieve results like these by designing *with forgings* either at the start or on re-design. The benefits of forgings are equally impressive, whether you make home-workshop equipment or diesel engines.

Forgings start as *better* metal . . . are further *improved* by the hammer-blows or high pressure of the forging process.

Write for literature on the design, specification, and procurement of forgings.

When it's a vital part, design it to be FORGED

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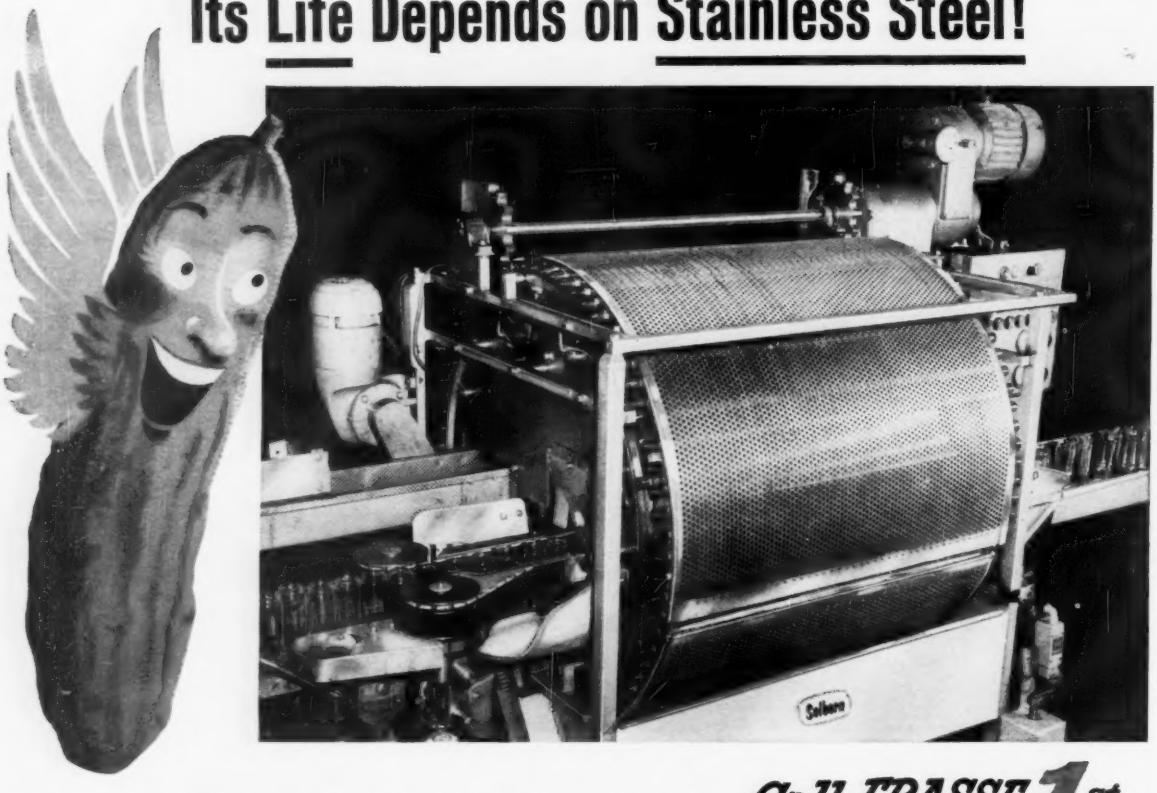
Meet the "Pickle Packer"—

Its Life Depends on Stainless Steel!



Pickles fly when this ingenious "Pickle Packer" goes into action. With unbelievable precision it packs 6,000 a *minute*—fills 18,000 jars an hour ...even guarantees full measure in the bargain. Seven times faster than previous methods...it's far less costly!

Despite corrosive brine, trouble-free operation and long life pose no problem...the "Pickle Packer" is completely made of corrosion resistant stainless steel. Stainless steel protects product purity—is easily cleaned ...meets sanitary codes.

Stainless steel bars, angles, sheets, plates, tubing and pipe are used in the "packer"...yet *every* item is shipped *from stock* by Frasse. Frasse carries every rolled form—in a wide range of sizes and analyses...has a wealth of know-how in applying stainless to *build sales.*

Think your product can use more *life*—and the built-in sales appeal of stainless steel? You'll profit by a call to Frasse.

Call FRASSE 1st for

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STAINLESS STEEL SERVICE

Bars	**Forgings**
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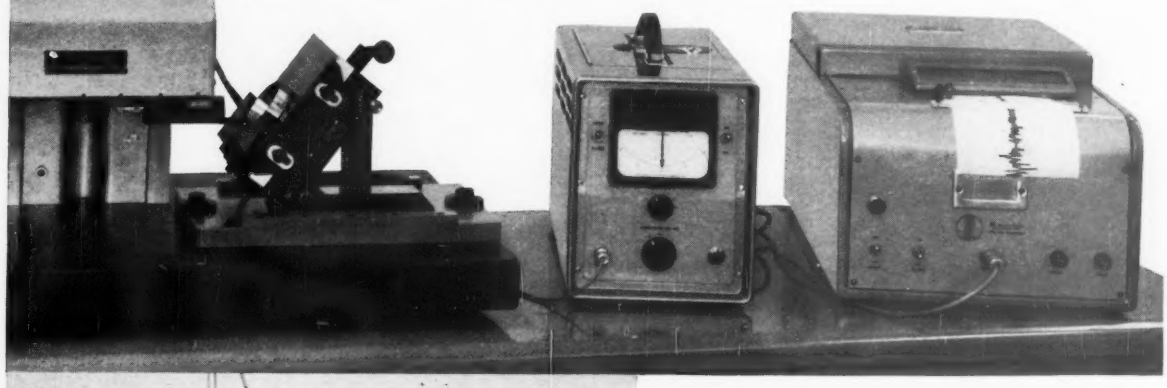
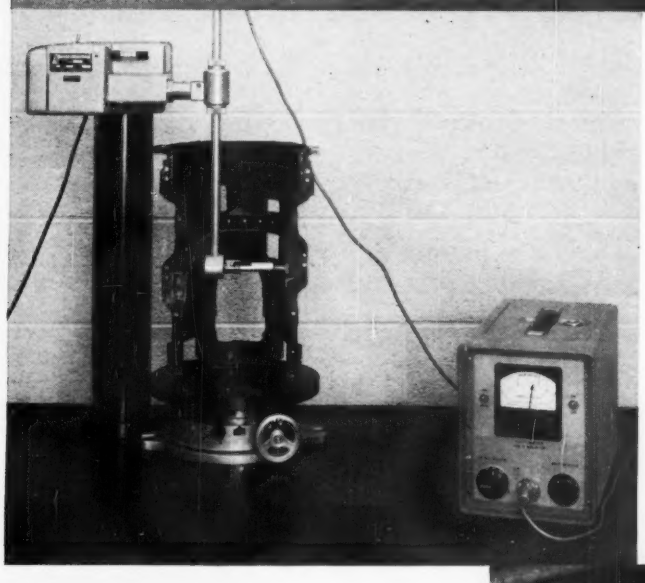
BREAKING MEASUREMENT BARRIERS WITH MICROMETRICAL

HOW TO SEE A SHAPE IN MILLIONTHS

To assure desired quality, a manufacturer needed to production-check the crown of tapered roller bearing components in millionths of an inch. Electronic indicators proved inadequate; so they came to Micrometrical. The result is the Microcorder® setup shown.

With the work positioned on a sine plate, a positive-displacement Tracer moves across the raceway, and a recorder draws a magnified profile of the surface. Each ¼" division on the chart represents a vertical distance of .000100" or .000025", as desired; so the contour is readily scaled in millionths. The equipment is used in the grinding room—for checking bearing cups, cones and rollers. BULLETIN LT40 gives details. Write for it!





FOR BOOM WITHOUT BUST—

In the Vulcan aircraft cannon, an internal cylindrical cam surface is critical to performance; and the manufacturer has to measure the roughness of this surface at many places. To do so quickly and easily, he uses the Profilometer® setup at left. This includes (1) a standard Linear Pilotor mechanism on an extra-high column; (2) a special Tracer (at bottom of vertical tube) that positions itself to all slopes of the cam; and (3) a standard Amplimeter, which shows the roughness height in microinches (arithmetical or RMS average). Ask for BULLETIN LT41.

Bring YOUR surface measurement problems to

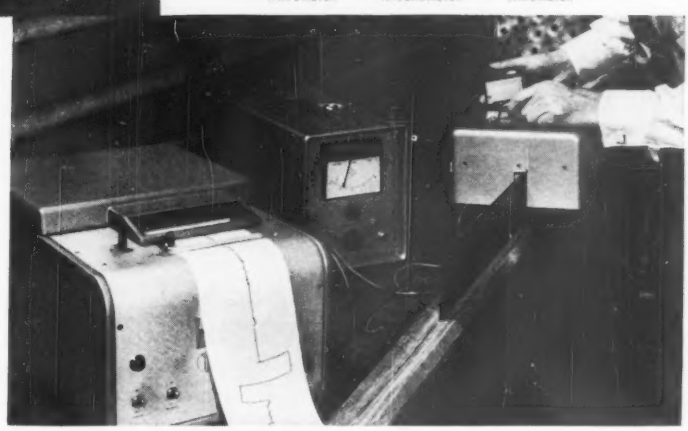
MMC® MICROMETRICAL MANUFACTURING COMPANY

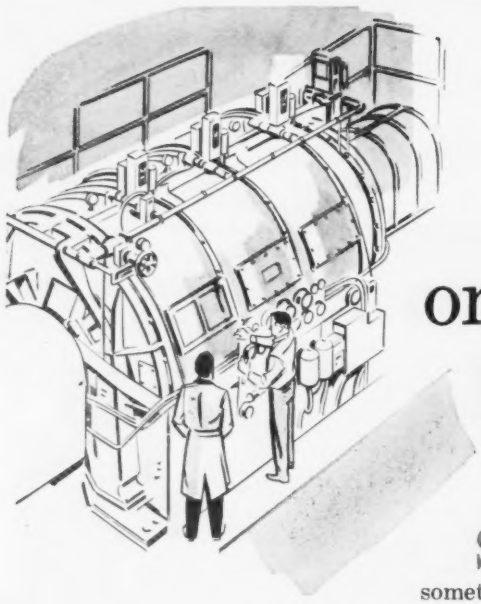
3621 S. STATE RD. ANN ARBOR 13, MICHIGAN

Manufacturer of the PROFILOMETER® • PROFICORDER® • MICROCORDER®
WAVOMETER® • ANDEROMETER® • VAROMETER®

SELF-PROPELLED THICKNESS CHECKER

The Microcorder® equipment at right is filling a steel mill's need for rapid edge-to-edge thickness checking of rolled steel. A self-propelled Pilotor with built-in Tracer moves along a sample strip, while a recorder draws a continuous chart that shows the size, shape and location of variations from nominal thickness. This is much faster, more accurate and more complete than previous methods—takes only 60 to 90 seconds for a 96" strip—and permits a 60% reduction in rejects caused by ridges. BULLETIN LT42 gives details. May we send you a copy?





There's more than one kind of Dynamatic service!

Some folks think of "service" as the help you need when something goes wrong. That's important, of course, and Dynamatic supplies it with competent service representatives located in principal cities throughout the United States and Canada. In addition, around-the-clock seven-days-a-week service is available from the factory.

But there's another kind of service that's equally important—the service that starts even before you have purchased Dynamatic speed control equipment. It's being able to sit down with your Dynamatic representative, knowing that he has very likely been up against a problem about the same as yours before; that he has a background gained through years of experience in this specialized field.

Dynamatic service begins with your first inquiry, includes start-up supervision by factory service engineers, and follows through for the life of the equipment.

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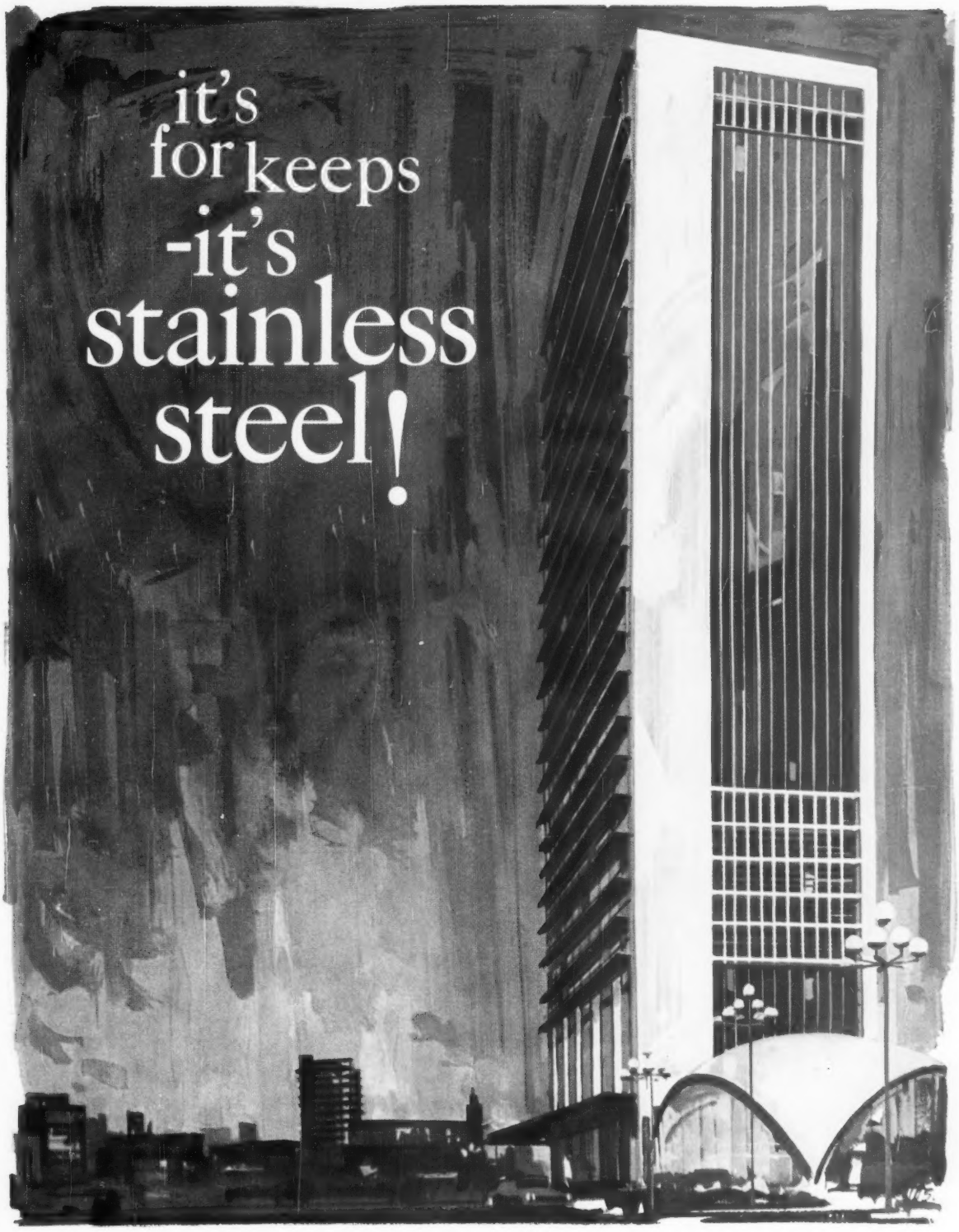

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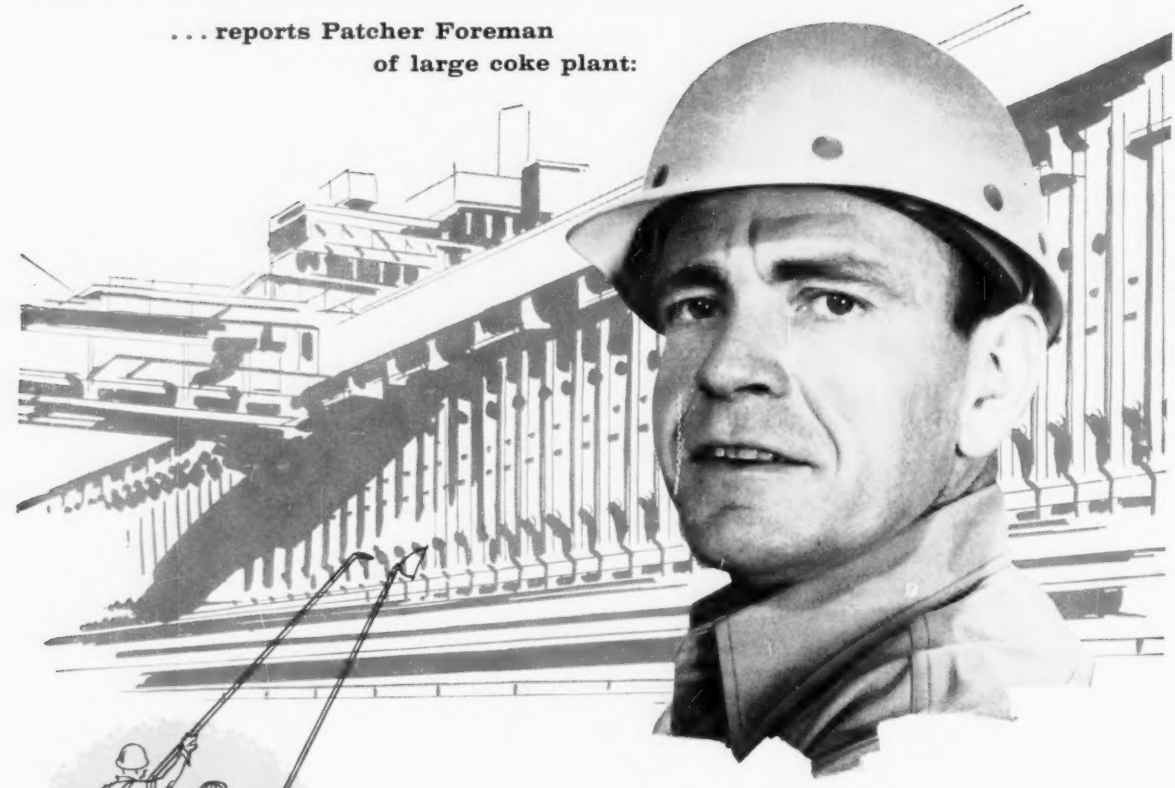
"For workability . . .

nothing matches Plibrico Spray-Tite"

. . . reports Patcher Foreman of large coke plant:



Plibrico Spray-Tite can be gunned in place with low rebound loss. Or trowel it in place; it's highly workable.

"We are using Plibrico Spray-Tite for patching our batteries with excellent success. No other refractory mix does so complete a job."

"We gun our oven jambs with Spray-Tite and have very little rebound. We're trowelling, too, on hot walls and this material stays workable. It doesn't back up on the trowel either."

Plibrico Spray-Tite is ideal for making repairs economically without service interruptions. Use it with wet mix or nozzle mix guns, or trowel it. It bonds well, and withstands abrasion and shock. It's one of a complete line of Plibrico refractory products.

Recommended for: **Coke oven walls, jambs, charging holes Regenerator faces • Uptake pipe seals.**

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WRITE TODAY FOR LABORATORY REPORT 900-A giving complete data on properties and advantages of Plibrico Spray-Tite.

R-5091P respirator is shown in combination with 701 goggles. R-5051P respirator is also available.

New safety for paint spray operators

Just approved by the U.S. Bureau of Mines . . . this new AO paint spray respirator protects against sprays and vapors of enamels, lacquers and lead-based paints. If you're now using any of the AO R-5000 series respirators, you don't need a new face mask, not even a conversion kit. Just replace the cartridges with either of two approved new units, and get maximum protection.

This new AO paint spray respirator is compact, light in weight, combines maximum efficiency and service life with ease of maintenance. It is one of 17 combinations possible with the R-5000 series. By simply interchanging filter units in one basic face piece you protect against a range of hazards, including mercury vapors, highly toxic insecticide and radioactive dusts.

For further information on any R-5000 respirator model, contact your nearest AO Safety Products Representative, or write for folder S-1297.

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SAFETY PRODUCTS DIVISION • SOUTHBRIDGE, MASSACHUSETTS

Flying workhorse airlifts 80-foot power tower

Nickel in alloy steels gives 'copter transmissions extra strength for the toughest jobs

This Sikorsky S-58 is carrying a prefabricated tower to a power line construction project near Lynchburg, Virginia. After setting the towers in place, the 'copter saves time and money by helping to string wire from tower to tower.

Again, these flying workhorses prove they can handle the roughest assignments. But pilots don't want superlatives or guarantees. They want to know without doubt that critical parts will do their job. That's one big reason why nickel is alloyed into the S-58's transmission shafts and gears.

Nickel helps steel take the tremendous bending and twisting of a 'copter's drive shaft under powerful shock loads and unusual conditions.

Strength and toughness are only two properties that nickel imparts to alloys. It can help them withstand the intense heat generated by supersonic flight . . . or shrug off the intense cold of liquid helium. It also offers outstanding corrosion resistance.

When you have a metal problem, don't hesitate to call us. Nickel or one of its alloys may provide the answer.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street INCO New York 5, N. Y.

INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

War of the Vanquished

Price fighting is the war of the vanquished. It is a war in which no one wins.

Price fighting erodes profits. It destroys the ability to research and develop new products and services. It restricts our re-equipment and modernization.

It prevents the creation of new job opportunities.

It stifles true competition. Companies and industries weakened by the effects of price fighting are prime candidates for price fixing conspiracies.

Price fighting in the long run injures the buyer. It weakens his venders and lessens the chances of his obtaining improved products at lower prices.

Price fighting is a major enemy to our economic strength and to the competitive system on which our strength is based.

Let us never confuse price fighting with orderly price reductions achieved through improved efficiency. Price reductions resulting from better manufacturing and management methods, more efficient equipment, and greater utilization of skills in all departments should be a prime goal aggressively pursued at all times. Such price reductions should be made with an honest understanding of costs and should provide for the maintenance of fair profits.

Price fighting disregards costs and profits. It is the least creative of all efforts to obtain business. It is the resort of the cowardly and the foolish.

Price fighting is like the common cold. It is with us always. But at times, it becomes epidemic. Metalworking has participated in more than its share during the past two years.

To bring to light the facts about ruinous price wars and to seek out some practical correctives, the editors of STEEL are devoting this issue to the malady. Task forces of more than a score of trained newsmen have talked with hundreds of industrial executives, management consultants, economists, and accountants. Their best thinking is presented here.

We hope this service will aid industry in combating one of its most destructive practices.

We hope we can contain price fighting before we are vanquished.

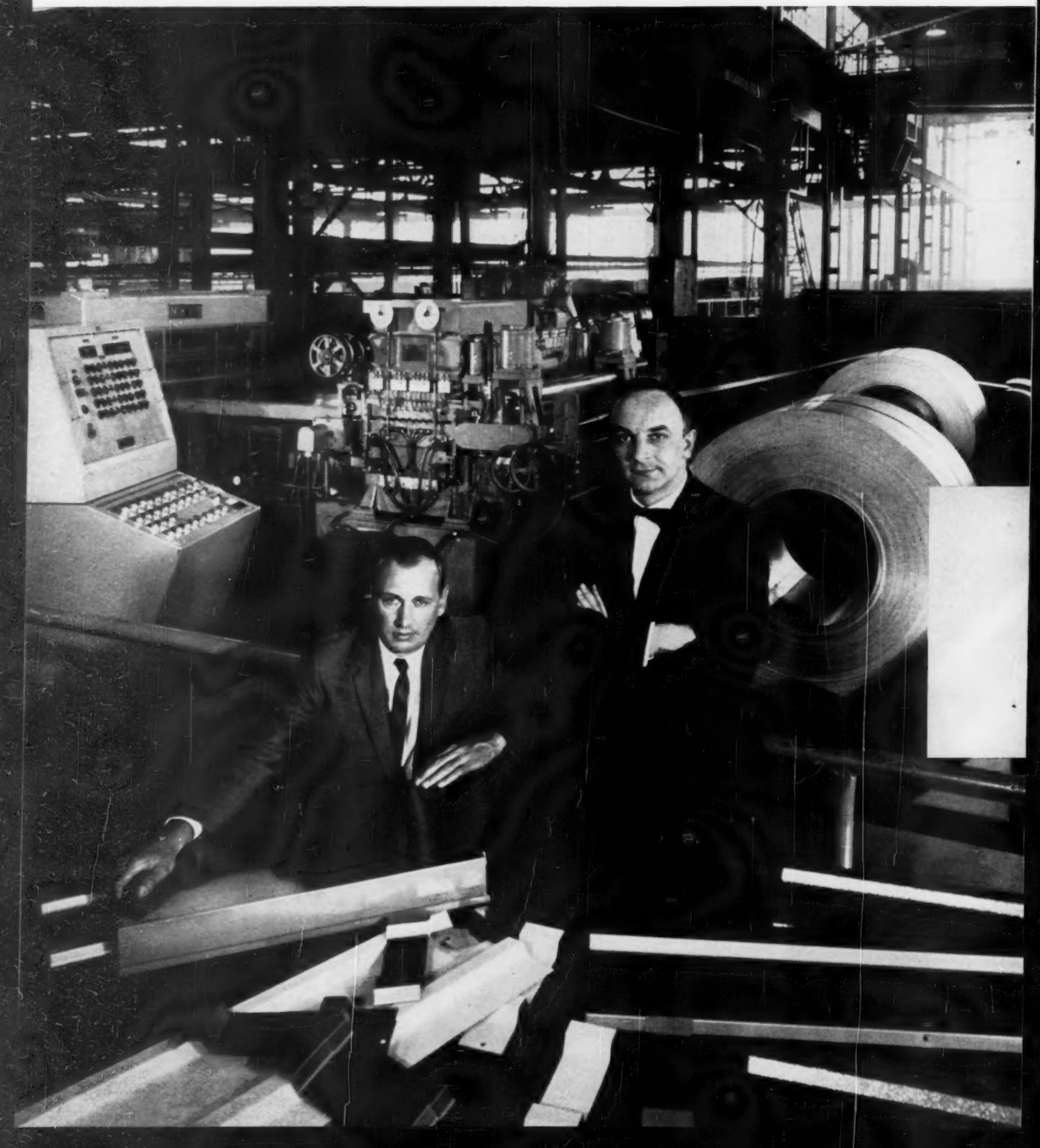
Walter J Campbell

EDITOR

This is McKay

McKAY DIE SHEAR LINES CUT MORE THAN STEEL. The most economical and efficient shear lines in operation today, they are being used by dozens of leading metal producers, fabricators and warehouses to slash shearing costs. Here, McKay Sales Manager Joseph F. Lyden, Jr., and M. G. Slaney, Building Division Manager, The Parkersburg (W. Va.) Rig and Reel Company —one of the nation's fastest growing manufacturers of pre-engineered metal buildings— examine panel sections cut to length by the high speed McKay Die Shear Line in the background.

Photo by Arnold Newman



Machine....

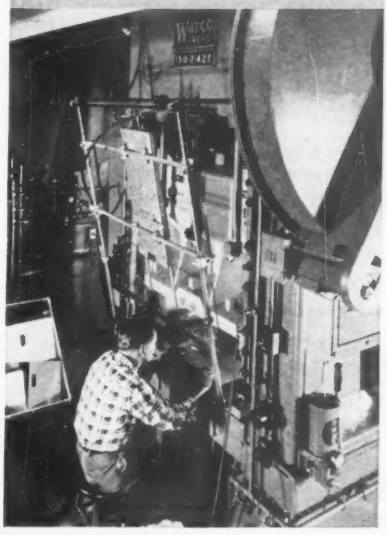
a recognized leader in the development and manufacture of high production metal processing equipment!

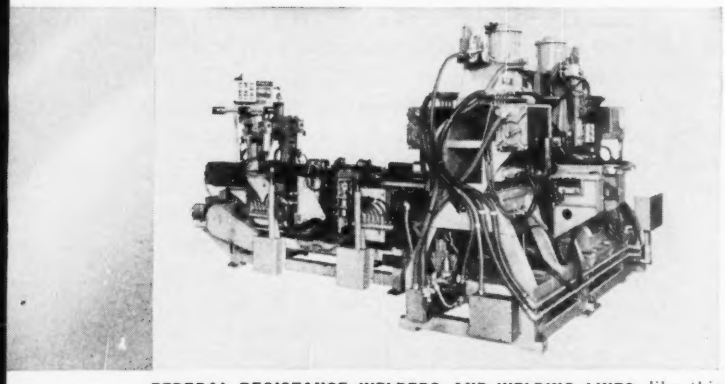
If you fabricate metals and are caught in the "profit squeeze" you'll want to know more about McKay Machine.

It was McKay Machine that pioneered automated integrated production lines, and it is McKay Machine that is today a leader in this field. We have conceived and produced complete lines for the manufacture of building panels, aircraft and missile sections, appliances, cabinets and components, automotive bodies and parts, and farm equipment—lines that are completely automated from *raw material to finished part or product.*

Whatever you make, if it requires metal handling, feeding, slitting, shearing, stamping, welding or forming, it's just good business to acquaint yourself with *McKay Packaged Production Lines*—high speed production equipment engineered to work in unison—with one-source responsibility from start to finish. Write for literature to *The McKay Machine Company, Youngstown 1, Ohio.*

WARCO MECHANICAL PRESSES—advanced in design, noted for their craftsmanship — are used throughout industry. Typical is the high speed, low maintenance 150-ton straight side crank press pictured here in operation at Eastman Kodak.

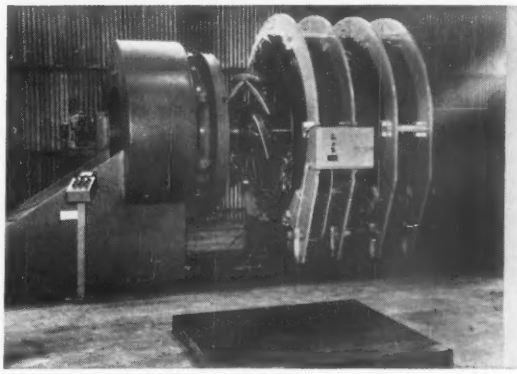




FEDERAL RESISTANCE WELDERS AND WELDING LINES, like this multi-gun combination spot and projection welder used by Hotpoint on their range production line, can be found in the plants of leading metalworking firms the nation over. Individual units, or complete resistance welding lines, are engineered to specifications by McKay's Federal-Warco Division.

LOOK TO

McKAY MCK MACHINE



BERKELEY-DAVIS AUTOMATIC ARC WELDING MACHINERY produced by Berkeley-Davis, Inc., a subsidiary, is highly popular in the aircraft, rocket, automotive and appliance industries. The rocket body welder pictured here is working at Aerojet General, subsidiary of General Tire and Rubber Company.

There's plenty of POWER for you in KENTUCKY

KENTUCKY'S abundance of coal and water has resulted in a tremendous concentration of electric power capacity. Today, steam and hydroelectric plants in Kentucky can generate more than 3,299,000 kilowatts of power—even more than Kentucky's greatly expanding industry can use. Sufficient reserves are *readily available in Kentucky* to supply any new or expanding industry with adequate power.

This is just the beginning! By 1963, new generating capacity *now being constructed* will add another 1,522,000 kilowatts to Kentucky's total power resources. Generating plants now in the planning stage will provide an additional 495,000 kilowatts. Some of these new projects include a new generating station on the State's eastern border; a plant on Lake Cumberland in southeastern Kentucky; increased capacity for a north-central utility; Barkley Dam on the lower Cumberland River; expansion of an existing power plant in central Kentucky. And when completed, a new power plant of over $100,000,000 in western Kentucky will be *the largest steam-electric generating plant in the world.*

And there's still more capacity for Kentucky. As further reserves, out-of-state power plants on Kentucky's borders are all tied-in on a power grid which can bring *plentiful power* to any city or town in Kentucky.

These are some of the reasons why Kentucky industry is growing faster than the U.S. average. Hundreds of companies have discovered that Kentucky offers maximum opportunity for progress and profits through its unique combination of advantages. If you are considering a new plant, let us show you what Kentucky can do for you.

Address: Lieut. Gov. Wilson W. Wyatt, or
E. B. Kennedy, *Commissioner,*
Kentucky Department of Economic Development
800 State Capitol Building, Frankfort, Kentucky

COMMONWEALTH OF
KENTUCKY

WHERE BIG THINGS ARE HAPPENING

Industrial expansion has been 43% greater in Kentucky since World War II than in the Nation as a whole. Why? Because literally hundreds of companies have discovered that Kentucky offers more opportunities for progress and profits.

And now a far-reaching new program has been put into effect to stimulate even greater development. Legislation favorable to Kentucky industry has been enacted . . . better schools and other needed improvements are being made possible through a new 3% sales tax (with many exemptions for industry—and which has enabled Kentucky to reduce its personal income tax by 36%) . . . *one of the most complete industrial financing programs in the Nation* is an actuality (with both privately and publicly financed lending agencies for new and expanding industry) . . . state authority has been set up for building desirable airstrips and access roads to plant sites.

Big things are happening in Kentucky. We will send you specific details on request.

Let's Stop PRICE FIGHTING

STEEL asked 7450 executives to name their biggest headache.

"PRICE FIGHTING!" said 56 per cent . . . "the cutting of prices without regard to costs, as distinguished from economic cutting, a desirable practice made possible via cost reductions."

A PRICE FIGHT is like a domestic tiff.

They're both easier to start than to stop. In both cases, the other party always begins the battle. Both fights create ill will that could be permanent. Both fights are expensive—sometimes disastrously so.

The problem is with us at all times, but it has reached epidemic proportions. It troubles all segments of metalworking. Manufacturers of electrical machinery are the most severely plagued. Instrument makers suffer from it less than any other part of our industry.

Who's to blame?

It has to be top management, even though the purchasing agent or salesman is on the firing line (see Page 51).

Who wins?

Nobody.

The biggest loser, paradoxically, is the buyer, despite the illusion of his short term benefit (see Page 57). A company that operates on inadequate profits—as it must if it price fights—cannot spend sufficient sums to improve a product and lower its cost.

Then why does price fighting persist?

1. Fighters don't know their true costs.
2. They don't understand economics.
3. They grasp at straws in tough times.
4. They are forced to sell at distress prices through accident or miscalculation.
5. They are economically ruthless, using price wars to enter a new field or force back competition.

Know Your Costs

Bertrand J. Belda, a partner in the accounting firm of Ernst & Ernst, Cleveland, advises that one way to stop price fighting is to know your costs and persuade your competitors to know theirs (see Page 66). He suggests:

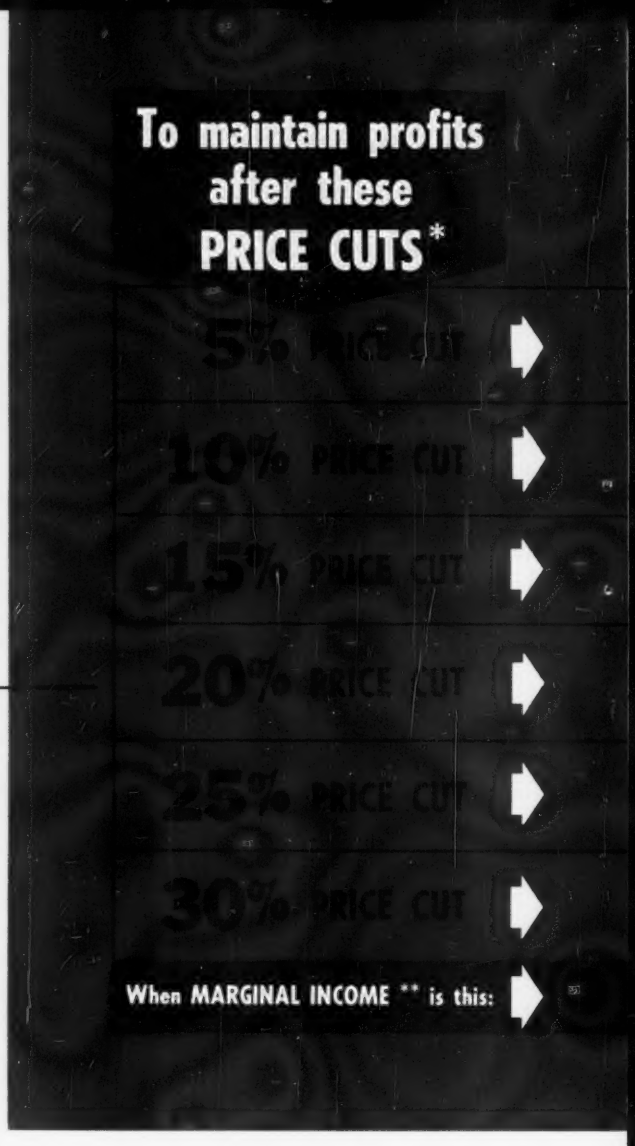
1. Break down your costs into direct and indirect categories.
2. Know how to measure them.
3. Know who's responsible for them.

No. 2 and 3 are the most troublesome. They must be resolved before or at the time of manufacture. Many costs are not really measured.

For example, in an aluminum foundry, flux costs $1 per pound. If you use too little, that's bad, but if you use too much, no serious harm is done to the melt. In one foundry, a laborer habitually

EXAMPLE: A maker of mill supplies offered discounts to distributors that amounted to 10 per cent on a line of drills. Although sales rose by 15 per cent, profits fell. A glance at the table shows why. His original marginal income was 35 per cent of his dollar volume. On a 10 per cent price cut, the drill maker had to boost volume by 26 per cent to maintain profits, not by 15.

EXAMPLE: To meet competition, a maker of radios redesigned his product and otherwise cut costs. He introduced a unit whose price was half that of his former line, but which would have the same marginal income rate of 40 per cent. Dollar sales volume climbed 50 per cent above the old level with the former product. He didn't think he was price fighting, but he wasn't making as much money as formerly. These calculations show what went wrong and why he was unwittingly price fighting: Figure the old price as 100 per cent. Subtract the new price as a percentage of the old—50 per cent in this case. Multiply the result by the marginal income as a percentage of the new price—40 per cent. The formula: (1.00 − .50) × .40 = .20 or 20 per cent. That means that the effect of lowering the price structure to half the old level (with the same marginal income rate) is equivalent to a 20 per cent price cut on old prices. The table shows that a 20 per cent cut on a 40 per cent marginal income requires a 60 per cent dollar volume gain, not 50 that the manufacturer actually accomplished.



guessed the amount needed. Study showed that in four months he wasted $80,000 worth.

Profits and Economics

One piece of business folklore goes like this: If I cut my price 10 per cent (without offsetting cost decreases), I'll keep my profit by boosting dollar sales 10 per cent. That's true only for companies which have high marginal incomes (the difference between the selling price and total direct variable costs in manufacturing, administration, and selling) that run 55 per cent or more of dollar volume. Such companies have high capital assets (like a specialty steel producer), or expensive personnel (a research type of firm, for example), or a patent-protected product that sells for a high price.

The overwhelming majority of metalworking's marginal incomes range between 20 and 50 per cent of dollar sales volume. At least half the marginal incomes run between 25 and 35 per cent.

The accompanying table indicates: To get the profit earned before you cut prices 10 per cent (without offsetting cost reductions), you must boost dollar sales at least 13 per cent if your marginal income runs 50 per cent, but you must increase them 80 per cent if marginal income runs 20 per cent.

Firm Grip on a Straw

Many companies will try anything when business is poor. Prices are obvious, so they are slashed in an attempt to boost volume. Hear Paul M. Arnall, president of Lunkenheimer Co., Cincinnati, maker of valves and engineering appliances: "The solution of operating problems by the theory of volume at any price has been disproved for ages, yet it apparently persists in the minds of some."

The company blames a drop in sales and earnings last year on "price fighting of chaotic proportions."

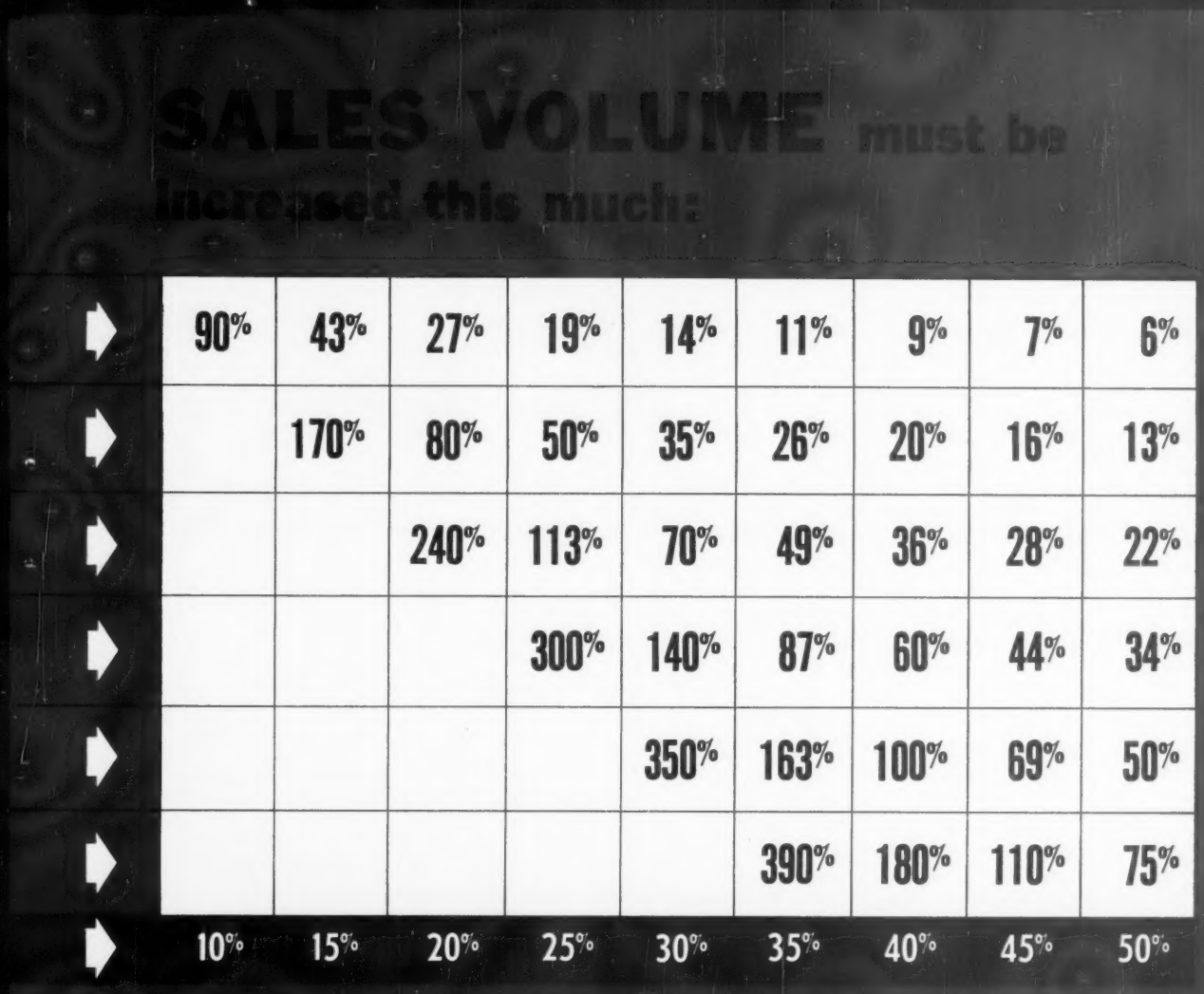
Prices are not as important in doing business as many people think. This study of why sales were lost proves the point. Of 100 lost customers . . .

68 drifted away because of supplier indifference.
14 had unadjusted grievances.
9 bought elsewhere because of lower prices.
5 bought elsewhere because of the influence of friends.
3 moved away.
1 went out of business.

Prices in Distress

The ruthlessness of economic events may force some price slashes through miscalculation or misadventure. Examples are overstocks of finished goods which must be sold, distress sales to raise money, and company liquidations.

Most pricing experts advise that such events be ignored as much as possible. But they all caution:



Be sure that the distress selling is really that and not a cover for a ruthless fighting operation.

Pricing Piracy

The most difficult kind of price fighting to combat is that practiced deliberately to enter a new market or force back competition.

The only sure defense is to match the lower prices —not with fighting but with economic cutting made possible by lower costs (see Page 79).

In the early 1950s, a large company used price fighting to enter an equipment field. Several established competitors were able to cut costs and meet the newcomer's quotations. The newcomer stood the pace for less than two years, then withdrew.

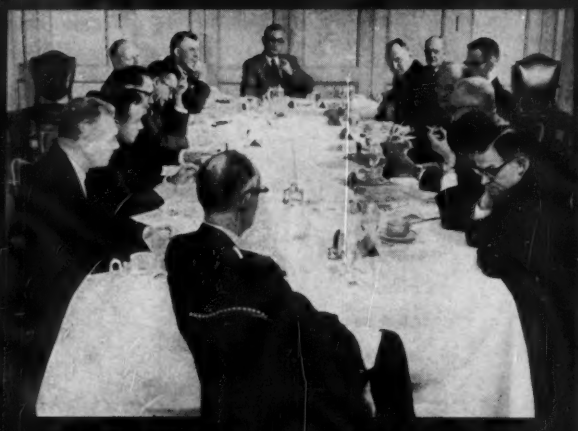
One manager from an established company recalls: "The development forced us to look closer at costs. We were able to come up with a less expensive, better product. The whole experience helped us in the long run. The fellow who really got hurt was the price fighter."

To Minimize Price Fighting . . .

1. Know your costs; urge others to know theirs.
2. Cut costs to enable economic price cutting.
3. Put more emphasis on quality, service, and engineering than on price.
4. Talk about price last.
5. Teach the role of profits and other economic facts of life.
6. Have the courage of your pricing convictions.
7. Ignore distress and marginal fighting.
8. Educate customers on the true cost of uneconomically low prices.
9. Beware of price fighting rumors.
10. Remember that nine times as many customers are lost through supplier indifference and unadjusted grievances as through lower prices.

• *Bound reprints of the study on Price Fighting are available at $2 a single copy; prices for larger quantities on request. Write Reprint Dept.,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

NEW YORK



CLEVELAND

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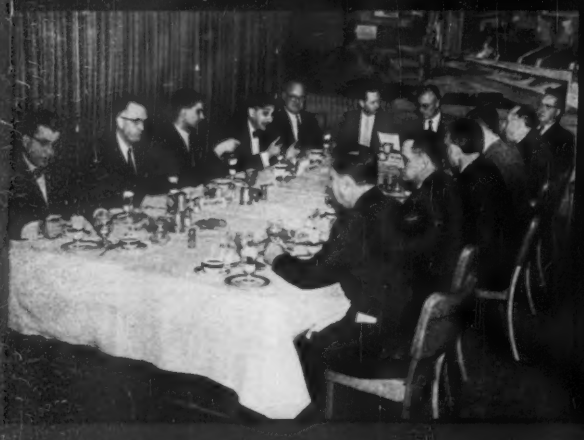

PITTSBURGH

Four Panels of Managers Probe Price Fighting Problems

STEEL editors invited businessmen in four cities to discuss the causes and cures of price fighting. The results of their thinking are the basis for much of the material in this special issue. Panel members are listed below.

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Resident Partner
Ernst & Ernst

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Vice President
Ohio Crankshaft Co.

L. S. CAWRSE
President
Republic Structural Iron Works Div.
Consolidated Iron-Steel Mfg. Co.

DAVID J. CHAMPION
Vice President
Champion Rivet Co.

W. E. GOMBERT
Purchasing Agent
Addressograph-Multigraph Corp.

GLENN N. HACKETT
Director of Purchases & Traffic
Thompson Ramo Wooldridge Inc.

LLOYD LEESEBERG
Assistant to the President
Superior Foundry Inc.

JACK G. MEHRING
Dir. of Purchasing & Prod. Planning
Cleveland Graphite Bronze Div.
Clevite Corp.

CHARLES SMITH JR.
President
Steel Improvement & Forge Co.

T. LAURENCE STRIMPLE
President
National Acme Co.

CHICAGO

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Director of Purchasing
Sciaky Bros. Inc.

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Northern Metal Products Co.

E. T. GUSTAFSON
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Cleco Steel Products Corp.

J. D. LOCKREM
Vice President-Marketing
Scully-Jones & Co.

L. R. ROTHENBERGER
Vice President-Sales
DoAll Co.

CHARLES STAINTON
Vice President & Dir. of Marketing
Controls Co. of America

C. H. STEVENSON
Vice President
Lindberg Engineering Co.

PITTSBURGH

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Vice President-Sales
A. M. Byers Co.

WILLIAM E. CLARK
President
Dravo Corp.

T. W. FAUNTLEROY
Vice President & General Sales Mgr.
Pittsburgh-Des Moines Steel Co.

EDWARD H. D. GIBBS
Vice President, Sales
Heyl & Patterson Inc.

THOMAS E. LLOYD
Manager of Marketing
Salem-Brosius Inc.

JOHN M. MacCRUM
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Executive Vice President
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NEW YORK

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Vice President, Purchasing
Worthington Corp.

ROBERT P. KING
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HARRY MARTIN
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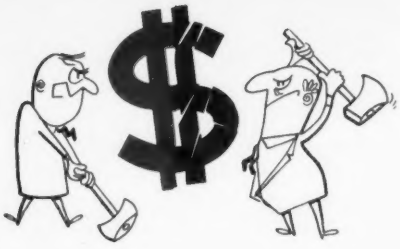
Sylvania Electric Products Inc., Sub.
General Telephone & Electronics Corp.



Price Fighting . . .

Who Starts It And How

"TOO MANY of today's managers act like employees instead of entrepreneurs," asserts Ed Cyrol, Chicago management consultant. That's why price fighting is the number one problem in metalworking.

The employee's primary interest is in keeping the shop running as near to capacity as possible. He is volume oriented. And his thinking is geared to the short term. His efforts are primarily directed toward increasing sales.

The entrepreneur seeks a fair return on the dollars invested in the business. He is oriented toward profitability. He considers the long term effects of his actions. He too seeks to increase sales, but he directs equal attention toward cutting costs and improving productivity.

Put those men in competing companies. Call them Mr. Employee Minded and Mr. Entrepreneur. Both recognize that the short term sales outlook is not good. Both firms have excess capacity. They sell their products to a buyer who is joyously aware that economic conditions are in his favor, and will employ a headful of tactics—some professional, some subtle, some unethical, some brutal, some downright illegal—to get the lowest possible price.

Mr. Employee Minded sees the unborn sale as a production order (or perhaps a sales commission). He'll be almost eager to grant price concessions.

Not so Mr. Entrepreneur—yet.

Now the third competitor shows up. He's an entrepeneur in his thinking—but he has weak knees. When his competition gets an order by lowering the price, Mr. Weak Knees hits the panic button. He's afraid his firm will lose two or three good customers to the price fighter.

He reasons: "What would the directors say? After all, they'd learn about losing a good customer pretty quick. And they won't know about the narrow profit margin on the job until it shows up in the monthly statement. Maybe I can bury it there. Or maybe we can trim costs somewhere. Anyway, it's easier to cover up a narrow profit than a lost customer. More places to put the blame."

Now there are two price fighters. A price war has been decreed.

Enter the fourth competitor. His firm has a hot shot research team—and a new manufacturing technique that lops 10 per cent off the product's cost. Mr. Research can profitably dispatch his sales army into the price war.

Mr. Entrepreneur is now in a bind. All the available business can be handled by the three competitors. He knows that it's better to pay for the overhead and keep his key people together than to close the plant. So Mr. Entrepreneur is dragged into the price war. Sure, he redoubles his cost cutting efforts. But he knows what will happen.

Pretty soon, Mr. Research, with his low costs, will decide that he can shave prices a little and still have the best profit showing in the industry. Mr. Weak Knees will really hit the panic button then. And Mr. Employee Minded will keep seeking volume. The cycle won't end until the next boom.

That chain of events has occurred in nearly every segment of metalworking. Human nature, given a conducive economic climate, has followed its predictable pattern.

Who's to Blame?

Price fighting is caused by people, not by economic conditions. Excess capacity, weak demand, inventory problems only create a climate conducive to price cutting. The human elements—fuzzy ethics, gullibility, lack of courage, sloppy economic thinking—are the real causes.

To blame price wars on economic conditions is like blaming drunkenness on the existence of alcohol. In both cases, the sources of the problem are weak will power, a failure to consider the consequences of the action. Sometimes, the culprit doesn't know the consequences. Or he is indifferent toward them. Or he simply lacks the courage to do what is best.

Those traits in a middle manager are understandable (though not excusable). Those traits in a top executive are unthinkable—but they exist.

Economic Conditions

"Sloppy economic thinking, not the economic conditions themselves, is the root of price fighting," asserts Robert King, president, Profit Counselors Inc., New York. But he points out that, when eco-

". . . several reasons account for deplorable price conditions in the fabricating industry: Increased foreign competition; willingness to keep busy regardless of prices; shopping for prices; reluctance to say 'no' when a job is below cost; panic . . ."

T. W. FAUNTLEROY, V. P. & Gen. Sales Mgr., Pittsburgh-Des Moines Steel Co.

". . . not enough work, desperation bidding, getting out of your field, not knowing enough about what you are bidding on, buyer's markets, foreign products, heavy inventory investments of suppliers, quoting prices without regard to costs . . ."

W. E. CLARK, President, Dravo Corp.

nomic conditions are conducive to price fighting, the sloppy thinking becomes more dangerous.

During good times, a seller is under no great pressure to make unsound price cuts. But when his plant is operating at 40 per cent of capacity, his sales outlook is poor, and he's in danger of losing key personnel, he's more likely to price fight.

Until management admits, in practice, that profits are really costs—and not avoidable additions to price, price wars will continue.

Price fighting does become more widespread when the economic conditions are ripe, as they are today. Sales have not increased substantially during the last three years. The outlook is not rosy. Capacity far exceeds demand. Foreign competitors can profitably sell their wares at prices below those needed by U. S. firms, whose costs are higher. Rapid technological change has brought about significant differences in the costs of two rival firms. Companies are moving into new fields in an effort to buttress low sales in their specialties.

Those factors have exerted an unrelenting pressure upon management. Too often, price has been considered "the only way out." As John M. MacCrum, vice president-sales, American Forge & Mfg. Co., points out: ". . . in some shops that work on a tonnage basis, if volume is down at the end of the month, prices will be cut just to get business. . ."

Era of the Price Buyer?

"The purchasing agent has built up much craftiness over the years and uses economic brutality to get prices down. If he can't push you around on the price itself, he'll try to get concessions on delivery or credit or some other factor—which really has the same effect. He invites price fighting by whipsawing one supplier against another. He pays more attention to the price than to any other factor. And he steals your proprietary information for a competitor—or for his own captive shop."

That indictment of the purchasing fraternity, a composite quotation from some participants in STEEL's price fighting panels, has a lot of basis in fact. While it certainly should not be applied to all purchasing people, for some it's a combination autobiography and operating procedure.

But the coin has another side. The buyer who is straightforwardly encouraging price competition should not be damned for his actions. Getting the lowest possible price consistent with quality needs is the purchasing agent's role in the industrial structure. Setting the price is, after all, the seller's job.

As David Gibson, vice president-purchasing, Worthington Corp., puts it: "I want to pay the going market price. I want every supplier to make a reasonable profit. But I can't afford—and I underscore this—to pay more for an item than my competitor."

Can't Our Salesmen Sell?

"Most salesmen really don't know how to sell. Instead of trying to get the buyer excited about what a product will do for him, the salesman is

more likely to use price as his main talking point. And he's always trying to get the buyer to reveal competitors' prices—when he should be pointing out why his product is superior to the competition's. Even companies that could command price premiums because of design superiority or outstanding service, or extra quick delivery, or superb reliability seem to be selling primarily on price today. And most salesmen just don't work hard enough or apply enough creativity to their jobs."

That's what many participants in STEEL's panels had to say about metalworking's sales corps.

STEEL's panelists generally agreed that today's price weakness could be ended by good marketing practices. But they pointed out that top management would have to take the initiative.

Price Fight Tactics

as practiced by the BUYER

THE PRICE CHISELER. He wants specialty items at off-the-shelf prices. He quotes fictitious prices supposedly given by anonymous competitors and coyly comments: "If we can agree on price, I might arrange for some long term business to go your way."

THE CHART FLIPPER. "We've logged our usage of the component you sell us. We think with your capacity and volume that we ought to get a lower price—or another supplier. We've got a big order ready to go . . ."

THE BUSINESS ANALYST. "Like everybody else, we've been building inventory and not making many shipments of finished products. All your competitors have big inventories, you probably do too. They've hinted at price breaks . . ."

THE CAPACITY CLUBBER. "Our management is more than satisfied with your castings, but you know we have that small foundry, and it might be reactivated. A few machines, a couple of men, and who knows . . ."

THE PRICE PASSER. He's the chameleon that likes to finagle on bids. In one case he tells the high bidders what the low bidders submitted, then waits for changes. He often assigns different bid deadlines to different bidders, then leaks information to the bidder he wants to handle the contract. Sometimes, he hosts a number of bidding teams in a hotel, obtains bids, then scurries from room to room playing one team against the other on price.

THE ERROR SEEKER. He says bids are needed in 48 hours on a "simple little job." In the rush to get a bid out, a vender makes a potentially costly error. "Of course we'll make an adjustment," says the happy buyer. "There are limits, though . . ."

as practiced by the SELLER

THE VOLUME HOUND. He sells as if he never heard of quality, delivery, service, engineering, or economics. His spiel: "To hell with market conditions—depressed, repressed, suppressed—I've been pushing 10,000 units a month for two years. Now if price bothers you . . ."

THE PANIC QUOTER. He has heard about low prices from a competitor's shop and doesn't realize the outfit's in a distress sale. He thinks to himself: "If their prices are down, we'll have to cut." His first move is toward the price list and that act sets off the fire.

THE WORLD BEATER. After mentally ticking off points against buying competitive foreign goods: "time factors, quality, uncertain supply . . ." this knee quaker quotes the lowest price in or out of the book. He convinces himself that the order will go abroad if he doesn't go for low.

THE QUICK CHANGE ARTIST. When the salesman learns his company's bid is too high, he frantically phones the buyer and says: "One of our subcontractors (nonexistent) just realized he has another order he can tie in with yours . . . if it's not too late, we can shave the price by . . ."

THE PLAIN WRAPPER. "Now I couldn't let this get out to the trade, but we have some standard stock you can get for a low dollar. It'll be in plain cartons, without our company's trademark, and it will cost you less than . . ."

THE CARTE BLANCHE CUTTER. He has authority from the sales manager to reduce prices by 10 per cent if cutting will swing a deal. His pitch: "We've got a little contest (imaginary) going in our sales department. Suppose I knock some of my bonus off the price just to get up to quota . . ."

The 12 characters identified above play prominent roles in an industrial tragedy called profit destruction. It's being enacted in metalworking plants across the country.

The setting is a worm can full of twisted factors—economic, human, technological.

The play begins with a buyer and seller talking price. It ends with the seller producing himself into bankruptcy.

It's not a new production. The plot is at least as old as prostitution. But it's an improvised rendition, and the actors continually find new methods of obtaining their desired, but undesirable, result.

That's approximately the way a casual reviewer would describe price fighting if it were stagecraft. But today's industrial observer, watching this real life tragedy, can't be so flippant.

If he considers its full implications, he recognizes that price fighting can thwart our ability to achieve

WHO STARTS IT AND HOW

satisfactory industrial growth.

Our observer, like STEEL's editors, will find such flagrant cases as two machine tools being sold at 20 per cent below the published price, and tons of fasteners sold at 8 per cent below the standard price.

In today's tough competition for business, such moves are understandable but nonetheless idiotic. Take the fastener case. How can an 8 per cent price cut be justified when the average firm's after-tax profit is only 3.5 per cent of sales?

Obviously, it can't. Still, such direct tactics are easier to stop than some other shrouded methods of price fighting. Take these, for example:

- **Credit Concessions**—When the buyer, to finance a sale, absorbs costs beyond what is the established norm in the industry, he's price fighting.
- **Carrying Inventory**—Many customers have transferred part of their inventory burden to suppliers—which has the same effect as a price cut.
- **Standard Rush Orders**—The supplier accepts a rush order with its added costs at standard price.
- **Ad Allowances**—Some advertising allowances are granted with the seller's full knowledge that his customers will place no advertising.
- **No Volume Discounts**—The seller grants the high volume price to the low volume buyer.
- **Low Grade That Isn't**—Among material suppliers, a frequent price cutting tactic is to sell standard quality items at "offgrade" prices.
- **Cashless Discounts** — Granting cash discounts when the bill won't be paid for 60 days—as in one case STEEL discovered—is simply price fighting.
- **The Vanishing Extra**—The buyer doesn't pay for extra work—such as a special size or finish.
- **Freight Absorption**—The seller pays the freight, but he doesn't count it in figuring his price.
- **Extra Inspections**—The seller gives an additional inspection so the buyer needs no receiving inspection.
- **Using Resale Outlets**—Some firms avoid price fighting as a matter of pride rather than profit. They sell at lower prices through resale outfits, but the effect on profits is the same.
- **Long Term That Isn't**—The length of some long term contracts has become decidedly short term.
- **Trade-Ins**—Sometimes the discount allowed is obviously not justifiable.
- **Free Engineering**—It takes many forms. Most prevalent is the potential customer who goes on a fishing expedition, asking for numerous bids on one job. All bidders "gamble" high engineering costs in the preparation of their quotations; only one gets his money back.
- **Special Guarantees**—A guarantee not made possible by higher reliability is a price concession.
- **Rebate**—It's often concealed in a payment for a fictitious marketing service rendered by the buyer, for nonexistent scrap, or for "consulting" aid.

L. S. CAWRSE
President
Republic Struct. Iron Works Div.
Consolidated Iron-Steel Mfg. Co.

". . . price fighting is predominantly a responsibility of management . . ."

EDWARD H. D. GIBBS
Vice President-Sales
Heyl & Patterson Inc.

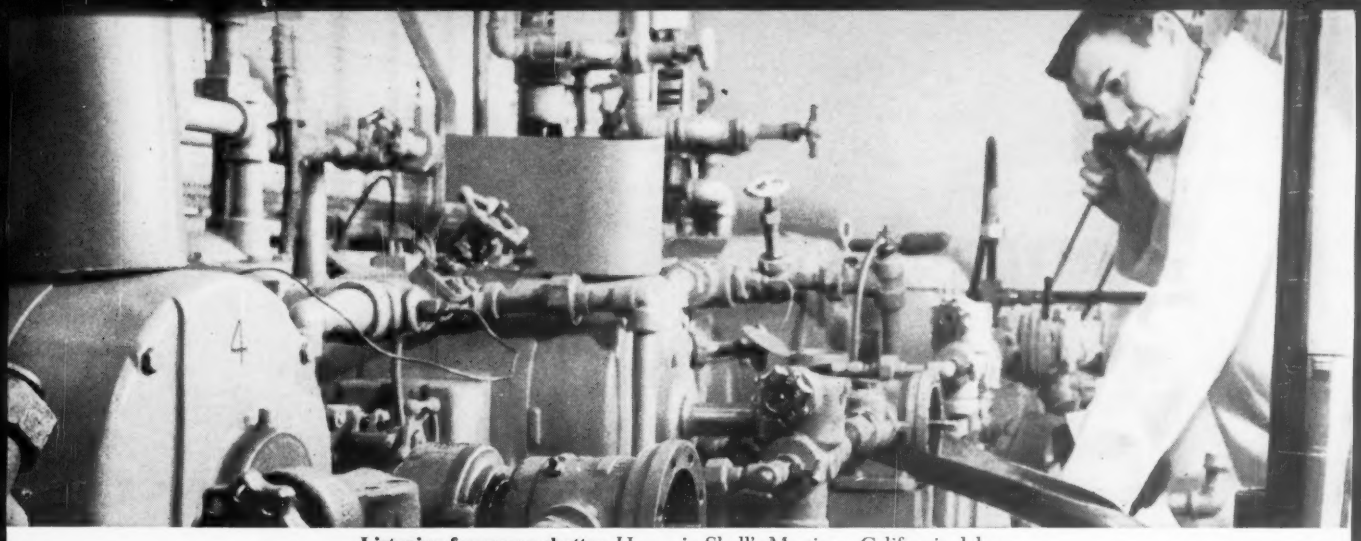
". . . an important cause of price fighting is the policy of many purchasers to buy on low dollar without complete evaluation of the quoted item's features . . ."

CHARLES SMITH JR.
President
Steel Improvement & Forge Co.

". . . sales representatives, particularly, start price fighting. You can control your own men better, but you have great difficulty with part time sellers . . ."

L. R. ROTHENBERGER
Vice President-Sales
DoAll Co.

". . . I'm convinced it starts with top management. One company has the purchasing agent report once a week on what he saved over the previous week . . . the dollars saved frequently come through price fighting . . ."



Listening for pump chatter. Here—in Shell's Martinez, California, laboratory Shell Tellus hydraulic oils are subjected to the most demanding tests.

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Price Fighting . . .

Free Enterprise Vs. Itself

"Of course it is possible to lower prices on products recklessly, but then where would we get the funds to develop the national economy further? Do you think God will send us new plants, factories, and powerplants? If we lower prices without considering the possibilities or raise wages without taking anything into account, will this contribute to the development of the national economy? Of course not. We would then spend our accumulations, would not obtain new accumulations, and would not be able to build such large plants . . ."

The speaker was not an officer of the U. S. Chamber of Commerce. It was Russia's Nikita Khrushchev, addressing Soviet workers. Pricing is a practical problem in any type society. Premier Khrushchev's reasoning applies to our economy as well as his own. But he can solve the problem by simple decree. We can solve the problem only by the application of high caliber brainpower and raw courage.

Nobody Wins

Price fighting is the "war of the vanquished." Nobody wins. The biggest loser is the buyer. Price fighting does give the customer an immediate benefit in the form of a lower price. But it's at the customer's own long term expense—because when the

ROGER BLOUGH, chairman, U. S. Steel Corp.

"With mounting production costs and the struggle to meet competition, pricewise, profits are squeezed in the middle. And as profits decline, so does our ability to deal effectively, through better tools, with the price competition that we face."

JUDSON SAYRE, chairman, Norge Div., Borg-Warner Corp.

"The manufacturer would serve the customer better in the long run if he did not arbitrarily cut prices. Sure, the pressure of economic conditions can be severe. But there comes a time when management must say: 'We're going to merchandise our way out, not price our way out.'"

What Price Fighting

These two median ratios highlight possible effects of price fighting on profits. In only 3 out of 14 industries did the percentage of net profits on net sales in 1959 exceed the 1955-59 average. Only 2 of the 14 recorded a higher percentage of net profits on tangible net worth in 1959 vs. the industry's five year average. How does your industry compare?

	Percentage Of Net Profits To Net Sales	Percentage Of Net Profits To Tangible Net Worth
AGRICULTURAL IMPLEMENTS & MACHINERY		
1958	3.97	10.76
1959	3.15	6.36
1955-59 average	3.67	7.67
AIRPLANE PARTS & ACCESSORIES		
1958	2.60	12.10
1959	2.65	7.60
1955-59 average	2.51	10.16
AUTOMOBILE PARTS & ACCESSORIES		
1958	2.53	6.18
1959	3.23	8.50
1955-59 average	3.28	9.13
BEDSPRINGS & MATTRESSES		
1958	1.37	4.66
1959	1.74	5.39
1955-59 average	2.10	6.17
BODIES, AUTO, BUS & TRUCK		
1958	1.50	3.45
1959	1.03	4.72
1955-59 average	2.01	6.41
BOLTS, SCREWS, NUTS & NAILS		
1958	2.12	4.04
1959	3.48	10.91
1955-59 average	3.55	9.02
FOUNDRIES		
1958	2.33	3.69
1959	3.15	6.97
1955-59 average	3.62	8.45

price is not high enough to return the seller a reasonable profit, he can't undertake the costly research programs, nor the expensive modernization necessary to give the customer a better product at a lower price in the long run.

Competing vs. Fighting

No supporter of the free enterprise system would favor the elimination of price competition. But neither would he favor a situation in which price is the primary competitive tool. Price should be just one factor in the rivalry among competitors.

The balance (or imbalance) between supply and demand should affect the price level. But not to the point where prices become artificially high or low. Today, we have the low situation. We have experienced the high side too, during past booms.

Neither situation is good. But let's concentrate on the one that's most immediate—price fighting.

Profitless Prosperity

Profitless prosperity is a certain result of price fighting. We're in such an era now. Sales are relatively high, but profits, in most metalworking industries, are alarmingly low. And they're sinking into invisibility. Examine this comparison prepared by the National City Bank of New York. It shows, for about 1500 corporations, the percentage change in net income, after taxes, from 1959 to 1960:

Iron & Steel	− 4
Electrical Equipment	−12
Machinery	− 5
Nonferrous Metals	− 7
Appliances	−18
Farm Equipment	−60
Aircraft & Parts	−29
All Manufacturing	− 4

The situation is even more alarming when you note that, for most firms, 1959 profits were far from satisfactory. (See tables above.)

The Way to Decay

The profit downtrend has dreadful implications. Profits are the lifeblood of our economy. Their level and trend determine the nation's ability to grow and the ability of our people to improve their living standards. Profits are the key to expanding job opportunities, to providing the tax revenues needed for our burgeoning public needs, to our long term rate of economic growth.

Unless we can restore profit levels to a reasonable point—which demands that we do more cost cut-

Can Do to Profitability

	Percentage Of Net Profits To Net Sales	Percentage Of Net Profits To Tangible Net Worth
HARDWARE & TOOLS		
1958	3.23	6.98
1959	3.71	7.84
1955-59 average	4.29	9.52
MACHINE SHOPS		
1958	2.38	3.91
1959	2.07	3.82
1955-59 average	3.33	7.69
MACHINERY, INDUSTRIAL		
1958	2.98	6.16
1959	3.43	7.49
1955-59 average	3.52	8.73
METAL STAMPINGS		
1958	1.54	4.44
1959	3.15	7.78
1955-59 average	3.23	9.02
RADIO PARTS & SUPPLIES		
1958	3.67	9.19
1959	4.05	10.12
1955-59 average	3.43	10.88
STEEL, STRUCTURAL FABRICATORS (Sell on Short Terms)		
1958	3.72	8.92
1959	1.63	4.82
1955-59 average	3.31	10.61
STOVES, RANGES & OVENS		
1958	2.06	5.52
1959	2.68	7.67
1955-59 average	2.32	6.36

Source: Dun & Bradstreet Inc.

ting and less price fighting—it is unlikely that we'll be able to meet our needs at home and our challenges abroad.

In today's world, few things are static. An industry either grows or it slowly decays. Price fighting is a vehicle that operates only on the road to decay. "The simple failure to distinguish between price reductions and price cuts took a multimillion dollar toll of manufacturers' profits in 1959 and 1960. There will be a similar butcher's bill to pay in 1961," says Eddy-Rucker-Nickels Co., Cambridge, Mass., management consulting firm (see Page 48).

'No Tickee, No Washee'

The Oriental laundryman who said that was only protecting his customers. So is the manufacturer who says "no profit, no sale." Reason: If the supplier frequently fails to make a profit, the customer loses out in the long run because the manufacturer will have no capital to invest in research and new facilities. U. S. firms are presently spending far too little for new facilities. A STEEL survey found that metalworking would have to invest $20 billion in new equipment today just to put its plants into an efficient condition. But the industry will spend less than one-fourth that amount this year. Obsolescence is outrunning modernization.

Price fighting causes inflation. Reason: Price fighting lowers profits. Without adequate profits, industry cannot modernize its facilities to trim costs. So inflation is the likely result. Thus, the customer's short term price advantage brings about a more costly disadvantage in the long run.

U. S. vs. the World

Markets outside the U. S. offer tremendous growth potential for U. S. firms—but the competition is tough, and we won't earn our share unless we cut our costs. We can't do that adequately unless we pour more dollars, from profits, into research and facilities. Our foreign competitors are doing that. We invest a smaller percentage of gross national product in new machinery and equipment than any of the 12 nations that are our principal competitors in world markets. While we're investing little more than 5 per cent, West Germany, Japan, Italy, Austria, Luxembourg, the Netherlands, and other nations are investing 8 to 10 per cent. That's one reason why we're suffering from foreign competition.

Price fighting's destructive effects show every sign of limiting our share of the world market to substantially less than our potential portion.

Meeting Our Needs at Home

U. S. industry is also faced with providing improved products at lower costs for our burgeoning home market. The Department of Commerce reports that we have one birth every 8 seconds, one death every 21 seconds, one immigrant every 2 minutes, and one emigrant every 17 minutes. Our net population gain is one person every 12 seconds.

That indicates the fantastic number who will be seeking jobs in the next few years. It takes industry to provide jobs. It takes capital to build industry. And it takes profits to provide the capital. The intensity of price fighting shows that management is paying too little attention to the necessary task of capital formation.

Is This the 'Junk Era'?

"Price fighting inevitably leads to some concessions in quality. We seem to be headed for, if not already

in, a 'junk era.'" So says Ed Cyrol, Chicago management consultant.

He points to the watch industry as an example. Competition became severe, and a few manufacturers decided their only salvation lay in producing a lower quality, cheaper watch. Such watches, of the pin-lever variety (the kind that work without jewels), dramatically increased their share of the market. That panicked some of the quality watchmakers into putting out low-priced jeweled watches that fell far below the accepted standard of quality. As a result, consumers became confused about the relationship between price and quality. They became disgusted with jeweled watches that were unreliable and switched to the pin-lever jobs. The upshot, in the eyes of some experts, has been that consumers no longer regard an expensive watch as a status symbol. So the demand for quality watches has slipped badly.

Other industries with a similar problem should keep their eyes on the watch industry's attempt to find an answer. One promising possibility is the electronic watch—with no mainspring or balance wheel. Bulova's Accutron, introduced last year, was the first to hit the market.

The watch industry may prove the validity of an assertion by Judson Sayre, chairman, Norge Div., Borg-Warner Corp. He says that price fighting does not exist in products where the buyer is truly excited about what the product can do for him. As an example, he cites his company's new, coin operated, dry cleaning machine. He says that no buyer has questioned the price. "You must give the customer benefits other than price," Mr. Sayre asserts. "Of course, even then, the price must not be excessive."

Fighting Causes Fixing

One of price fighting's serious implications is pointed out by Robert King, president, Profit Counselors Inc., New York consulting firm. "Price fighting can lead to price fixing," he declares. He notes that when companies undercut one another until the profit squeeze threatens to maim the entire industry, the temptation becomes great to get together and set a price. He warns buyers to recognize that distasteful possibility when they're tempted to use ungentlemanly tactics to force prices down.

STEEL learned that was one of the factors which led to the price fixing scandal in the electrical equipment industry. The chief offenders were buyers working on government jobs who used whipsaw tactics on suppliers to start price wars. The easy way out for the suppliers was to band together.

One example mentioned to STEEL involved the purchase of some engine equipment. The government buyer invited bids on the job, then told the high bidders what the low bid was. After several undercut that price, he told the original low bidder what price he would have to quote to get the job. The result: The final price was more than 9 per cent below the original low bid. And STEEL's source contends that the company which finally got the contract lost a substantial sum on it.

Numerous similar cases were cited to STEEL in recent weeks. STEEL's sources, in most cases, were extremely reluctant to give dates, names, and places. One gave this explanation: "If I tell you the name of the buyer and the time and place of the event, that buyer and his supervisors—who are supposed to control his actions—will see to it that I don't get another contract from that agency."

Said the marketing manager for an Eastern firm with significant government business: "The best way the federal government could guard against price fixing would be to educate its procurement people in economics and morality." Added an observer: "That would be good procedure for industrial management too."

Age of Immorality?

The examples cited above indicate that price fighting can foster an unethical mode of operation in industry. And a moral code is usually pliable enough to adjust to a basically wrong practice when "everybody does it."

"Corporate cowards, frequently found in top management, can't be expected to halt practices that are popular, even though they are economically unsound or morally wrong," asserts Mr. King.

He suggests that price fighting is another indication of one of industry's most critical problems: The gutless executive. Says Mr. King: "A manager is paid to make decisions based on judgment. He isn't paid to tally opinions around a conference table, nor to rubber-stamp an 'expert's' opinion. Certainly, a competent manager will use every available resource to arrive at a decision. But never will he become subservient to the tool itself."

Killing the Manmade Monster

Price fighting is a manmade monster with a constantly increasing appetite. Begotten by the free enterprise system, it threatens to commit patricide. It leads to such evils as inflation (its own opposite number), price fixing, and breaches of ethics (one of its parents). It forces profits down so badly that it stunts our industrial growth. It seriously hinders our long term ability to compete in world markets. But it imposes its most serious maladies on that group that praises it most—the consumers. While they are rejoicing about its immediate and most apparent result, lower prices, it is secretly but surely robbing them of their ability to obtain better products at lower prices in the future.

Metalworking managers must awaken to the ruinous capabilities of this monster, educate their customers about its effects, and apply their best brains and stoic fortitude to its elimination—by lowering their costs, improving their marketing skills, and applying courage to their pricing policies.

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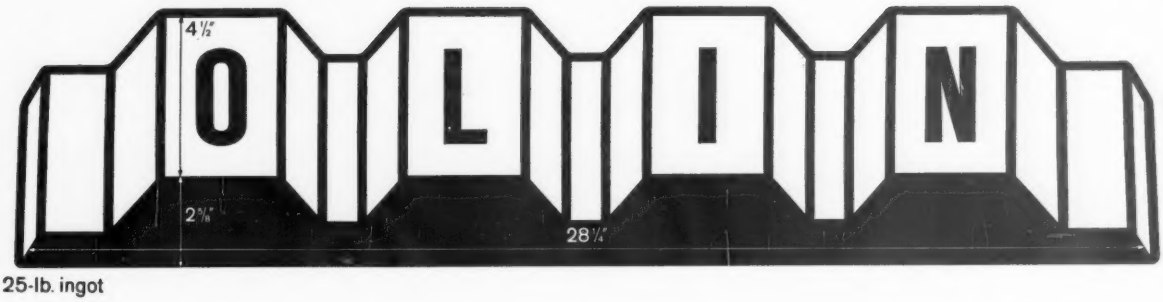

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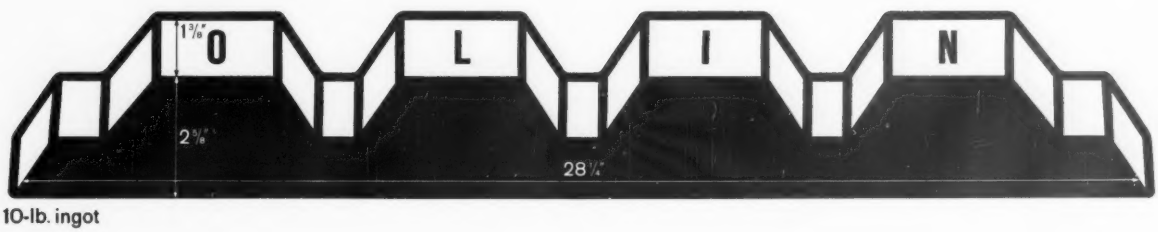

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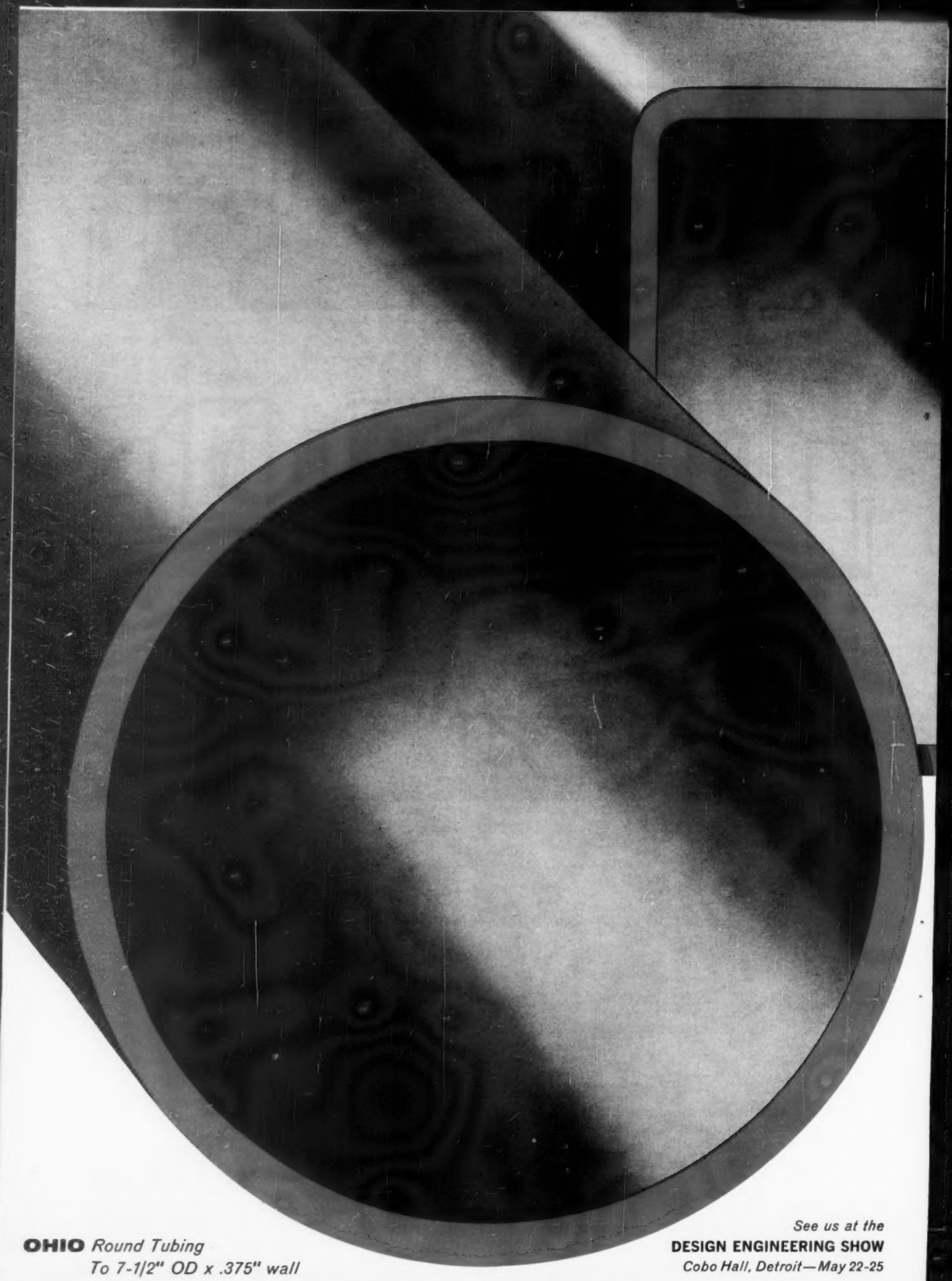

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Company _____

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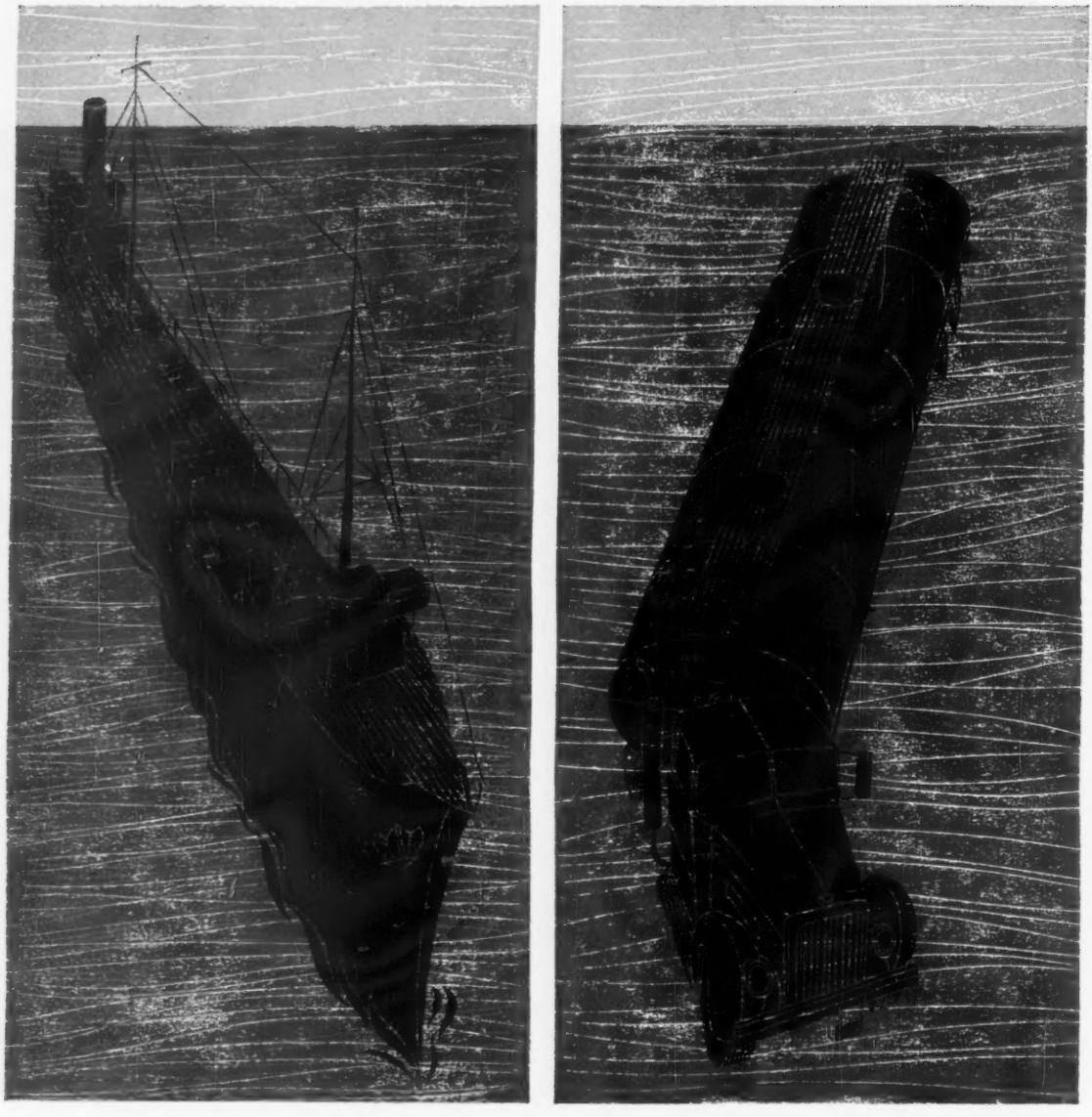

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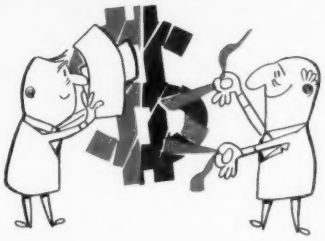


Price Fighting . . .

How to Stop It

PAUL MAGNUS
Executive Vice President
Rosedale Foundry & Machine Co.

"We tried to ride prices down in 1958 like every one else in our industry. We took a shellacking and finished in the red. In 1959, we reversed ourselves. We found out what our costs were. We began quoting fair prices which included a fair profit. We were frank to admit we didn't want a job unless there was a profit in it. Result: We're back in the black."

THAT'S HOW Paul Magnus, a member of STEEL's Pittsburgh panel, described the action his firm has taken to combat price fighting.

His comments contain a pointed lesson: No magic formula will stop price fighting. And nobody will do it for you. (As one panelist put it: Most external forces that might do the job are illegal, immoral, or involve government control.) The action has to be your own. Three steps are basic:

1. You have to know costs—and true profits.

This means more than good bookkeeping—figures at the end of the month that tell whether you've made a profit. Too many firms have allowed accounting people to be concerned primarily with telling the story of what has happened.

That isn't enough. Cost information should be dynamic. It should identify problem areas as the trouble occurs so that corrective action can be taken immediately. You can't turn an unprofitable part into a moneymaker after it's shipped to the customer. Your cost information must not only tell what happened but why.

With such information, you're in a good position to intelligently search out ways to lower costs and make economic price reductions possible. Methods of attacking costs are described on Page 79.

2. It takes courage of convictions.

There'll always be somebody willing to quote a lower price. The problem is not one of determining whether to follow the low man's lead. He may be headed toward bankruptcy. Your job is one of determining whether your costs are in line, whether you're as efficient as you can be. The crucial measure of performance in business is still profit—without it you cannot hope to grow, to keep pace with technological advances, to maintain your competitive position, and in the long run to survive.

Let's face it—price competition is a fact of life. You can't avoid it. But your best offensive is to intelligently determine the point at which you go no lower. Then make your stand, make it known that you don't want an order unless there's a profit in it.

"One of the hardest lessons to learn," laments a Detroit executive, "is that it's not worthwhile to engage in unreasonable price fighting to keep business. Most of the customers you lose that way aren't worth keeping anyway."

Low price doesn't guarantee more business. Listen to H. Thomas Hallowell Jr., president, Standard Pressed Steel Co.: "We tried low price on one customer—a terrific price buyer. We offered a low price if he would give us all his business. He wouldn't because he didn't want to limit his sources of supply."

3. It takes better selling to stop price fighting.

Price is a strong factor in any sale—perhaps the strongest today. But it is still only one of the factors. You're also selling quality, delivery, service, terms of payment, engineering, and a host of other factors.

"We (top management) are the weak ones," points out a Cleveland sales vice president. "We let a salesman stampede us into cutting prices when he calls in panting that he can close the deal if we'll shave 10 per cent off the price. The office girl could probably make the sale at the same price. Better salesmanship could have won many orders lost to price alone."

Know Your Costs

Accountants are quick to emphasize there's no one best accounting system for all companies. There's

Break-even charts help you . . .

Know Your Profit, Volume, Price Relationships

The key to the successful use of break-even type analysis charts is the determination of variable expenses required to support each unit, or sales dollar . . . and the ascertainment of fixed expenses per period of time, points out B. J. Belda, partner, Ernst & Ernst.

Follow the four steps and see how a 10 per cent price reduction in this example affects profits.

only one basic criterion: How responsive is it to management's needs?

1. Does it break down all costs—materials, direct labor, and overhead into useful components?
2. Does it provide standards of costs which can be measured and related to the product or part as it's going through the plant?
3. Does it classify costs by functional areas, permitting the establishment and measurement of standards?
4. Does the system pinpoint responsibility with the individual who can control costs?

The break-even chart (shown at right) is becoming an increasingly popular tool for companies to determine their profit, volume, and price relationships. "The key to successful use of this type analysis is the determination of the variable (direct) expenses required to support each unit or sales dollar and the ascertainment of the fixed expense amount per period of time," points out B. J. Belda, partner, Ernst & Ernst, Cleveland accounting firm.

"Most companies are doing a pretty good job of breaking down costs of materials and direct labor," explains Mr. Belda. "Major weaknesses are in identifying overhead costs."

• **Matter of Survival**—W. F. Rockwell Jr., president, Rockwell Mfg. Co., Pittsburgh, pulls no punches in agreeing: "The systematic study—and reduction—of overhead costs will be a major factor in who is and who isn't going to stay in business during the next ten years.

"Most cost reduction has been achieved in the area of direct labor. At Rockwell, our direct labor

1. BASIC FACTS

Average Selling Price per Unit	$ 100
Direct Cost per Unit	$ 55
Fixed Expenses per Year	$3,500,000

2. SALES VOLUME REQUIRED TO BREAK EVEN

Fixed Expenses	$3,500,000
Direct Costs—77,778 Units at $55 =	4,277,800
TOTAL	$7,777,800

3. PROFIT AT "NORMAL" VOLUME

100,000 Units at $100 Each	$10,000,000
Costs and Expenses:	
Direct Costs at $55 per Unit	$ 5,500,000
Fixed Expenses	3,500,000
	$ 9,000,000
Profit	$ 1,000,000

4. VOLUME REQUIRED TO MAINTAIN SAME NORMAL PROFIT AFTER PRICE REDUCTION OF 10%

FORMULA:

$$\frac{F + P}{1 - \frac{(V)}{(S)}}$$

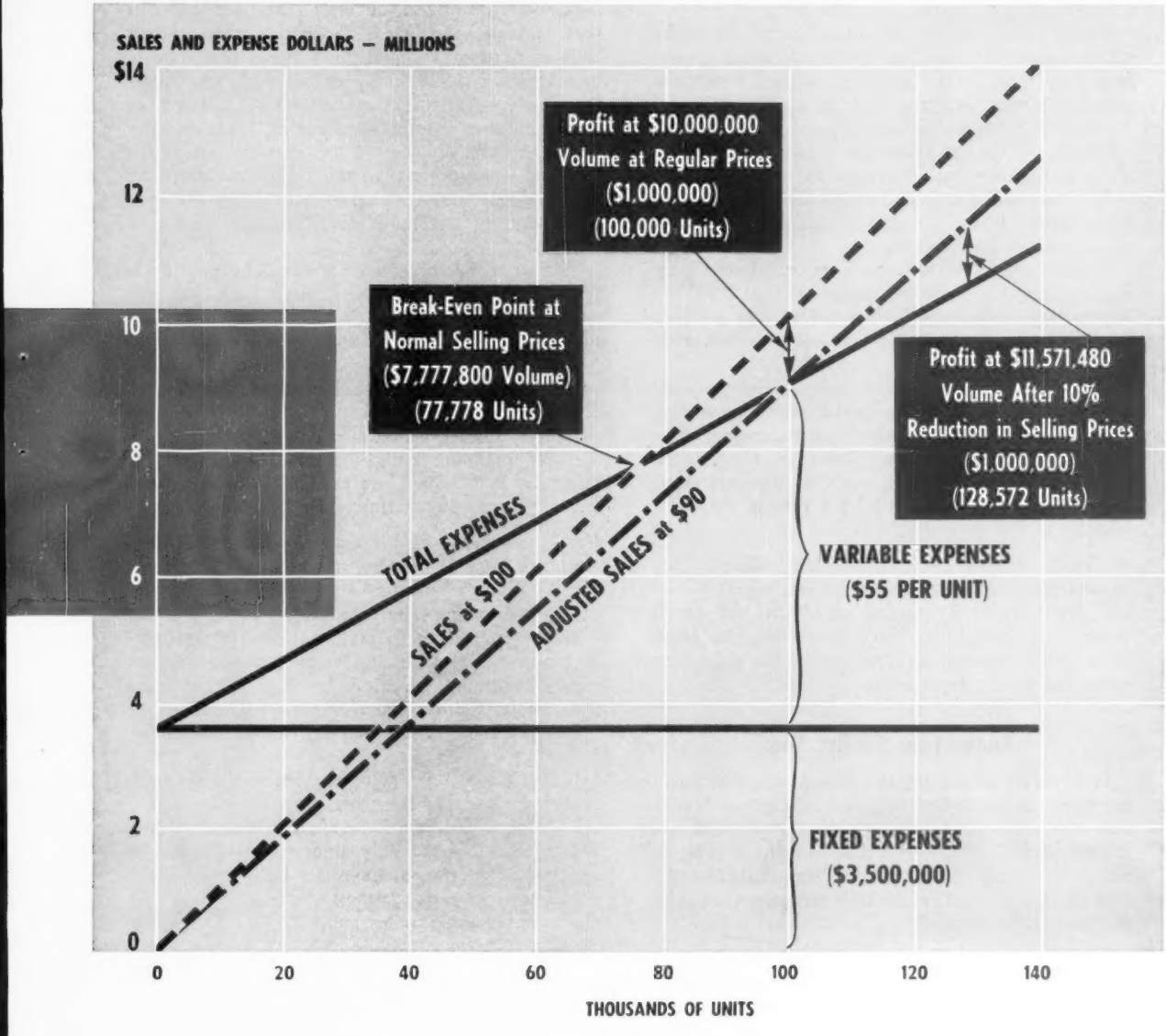
F = Fixed Expenses
P = Profit To Be Realized
V = Variable Expenses of Normal Sales Volume
S = Normal Sales Volume Less Amount of Price Reduction

APPLICATION:

$$= \frac{\$3,500,000 + \$1,000,000}{1 - \frac{(\$5,500,000)}{(\$9,000,000)}}$$

$$= \frac{\$4,500,000}{7/18}$$

$$= \$11,571,480$$



costs to sales have dropped 9.2 per cent in the last ten years, while our overhead costs are up 50 per cent! In 1956, our overhead was 29 per cent of the sale dollar; last year more than 35 per cent."

Management has shied away from trying to identify overhead costs as aggressively as it has direct labor and material costs. The reasons are obvious:

- Direct costs are easier to measure than overhead.
- Direct work is more repetitive, permitting more opportunity for standardization and refinement.
- Direct work can be eliminated by labor saving machines and tooling.

Even though most overhead costs can't be isolated to the degree that most direct costs can, many companies are taking progressive steps in getting better control of them. You'll be surprised by what a few checks in your own plant will reveal.

A study by Ernst & Ernst produced these eye openers for one firm:

The maintenance division was asked to make 12, single-shelf bookcases. They cost the firm $150. They were available commercially for $60.

On another occasion, maintenance produced 100 steel washers for a special job. Cost $40. They could have been purchased for $12.

The time turned in on the repair of a suction fan (2 ft in diameter) was 32.1 manhours. The job required removal of the fan and rebabbitting of two bearings. Investigation revealed that it should have taken about 8 hours.

Mr. Rockwell cites an example involving comparative setup times on common machines like drill presses and turret lathes in different locations. "Our foremen were amazed at the number of 15 minute to 1 hour jobs for which the workers were charging 2 to 4 hours."

• **Getting a Start**—Rockwell's attack was to assign estimated standards to all setups. The basic idea was

to weed out grossly unreasonable costs.

Result: Many of the shortcomings proved to be in management's domain, including missing and improper tools, poor material delivery, improper scheduling, and excessive waiting at the crib.

In early 1959, setup in one plant was averaging 18 to 20 per cent of direct labor costs. For the last six months, they have averaged 10 to 12 per cent.

The potential comes into focus when you multiply those examples by the number of areas in which costs are guesstimates at best.

Clerical and supervisory costs are equally challenging hurdles. Mr. Rockwell points out that his firm's supervisory and clerical costs have risen roughly 33 per cent in the last five years—probably a good average for most firms.

Alert metalworkers are attacking clerical costs with many of the same performance measuring techniques used in direct labor—work sampling, time study, pre-established data. Robert F. King, president, Profit Counselors Inc., says that data are available today for better than 80 per cent of the office jobs.

• **Payoff**—Armco Div., Armco Steel Corp., cites an example in its production scheduling and control department. By setting standards and developing incentives, it was able to decrease its office force by 20 per cent and yet double the shipments controlled by the department.

Know Your Profits Too

Profitability accounting is a concept you'll be hearing more about—it was described at a recent American Management Association session in Chicago. It's implication: Profits should be thought of in much the same reference as costs. They should be identifiable by each product so that they can be controllable; they should be planned.

Profitability accounting, says Robert Beyer, executive partner—management services, Touche, Ross, Bailey & Smart, suggests that most costs are part variable, part fixed. So rather than classify costs as fixed or variable, he suggests that they be broken down into standby or variable components. Standby costs are those which remain under conditions of "no volume"—as during a strike.

The concept includes a category of programed expenses (costs other than standby or variable types that are controlled by management decision). Good examples are research and development expenditures, advertising.

The categories of cost determined by product in profitability accounting then become:

1. Variable costs. They include sales deductions such as discounts, commissions, and allowances; direct materials, direct labor, variable manufacturing expense, variable commercial expense.
2. Standby expenses.
3. Programed expenses.

Profit planning calls for detailed forecasts of shipment by product line and mix within product lines, then relating performance to the forecast.

• **It Takes Practice**—Proponents of profit planning are quick to point out that it'll be a rare occurrence when the profit plan meets expectations in the first year of operation. The value of the method is that it gives management the ability to gain performance improvement by analyzing volume, sales mix, production planning, inventory levels, cost allowances, and a host of other management considerations.

Set up properly, profit planning has four key benefits:

1. It adds one step of refinement to the planning of new product and market growth.
2. It helps distinguish between needs and wants. The head of any family understands—there's no limit to our wants, but there is a limit to needs and resources.
3. Profit planning adds another factor in developing cost consciousness within the organization.
4. It helps to assure a critical appraisal of every

"We need to develop accurate knowledge of administrative work content, then set up standards of performance. At this point, these costs can and will be controlled."

W. F. ROCKWELL, JR.
President
Rockwell Mfg. Co.

These functions must be planned to . . .

Know and Control Your Maintenance Costs

1. A practical work order system covering these maintenance activities:

- **Routine Orders—a list of permanent orders covering periodic cleaning, inspecting, oiling, and similar jobs.**
- **Repair Orders—written orders covering most equipment and plant repairs, plus some small manufacturing work.**
- **Work Orders—covering major jobs usually requiring over 100 manhours.**

2. Systematic scheduling and planning program to:

- **Determine Job Priorities.**
- **Determine Manpower Needs. Schedule correct number of men to do job. Schedule overtime, weekend work, subcontracting required.**

3. Stores control of spare parts and materials require:

- **Systematic ordering and issuance of parts.**
- **Adequate records and controls to maintain inventories of materials at minimum levels.**

element of the business.

One further element in setting up a system to pinpoint costs and profits: Your method of presenting operating reports to your managers can spell the difference between success and failure. Reports do not control performance, they can only aid control. They should:

- Suggest action.
- Emphasize deviations from objectives.
- Direct thinking toward those goals.
- Indicate the probability of reaching the goals.

Too much detail will interfere with communication. History is a poor standard. Trends and indexes are more useful than accounts and pennies.

Effective reports must be tailored to the personnel and policies of the organization. They must reflect the operating climate and objectives of the company. They must measure rates of profit at their source.

Some companies are unwitting price fighters. They don't know their costs and true profits and don't realize they are shipping part of their capital out the door with every order. If they learn more about their own business, they have taken the first step to stop price fighting.

Managers Need Courage

"THERE IS a certain blend of courage, integrity, character, and principle which has no satisfactory

". . . We consider quality of sales volume rather than quantity . . ."

ROBERT C. TRUNDLE
President,
Trundle Consultants Inc.

". . . Competition is more than price—we look for competition of ideas . . ."

J. W. LINDSEY
Vice President, Purchases,
Jones & Laughlin Steel Corp.

". . . Weak pricing policies tend to destroy creative, energetic sales effort . . ."

JAMES J. NANCE
President & Chief Executive Officer,
Central National Bank of Cleveland

". . . We receive quotations in a bidroom—it protects the buyer against indiscriminate accusations and protects bidders . . ."

JOHN HOWELL
Purchasing Agent,
Republic Aviation Corp.

dictionary name but has been called different things at different times in different countries. Our American name for it is 'guts.'"

Louis Adamic
A Study in Courage

"Executives often fail to understand the cumulative consequences of their actions."

Those words were uttered in exasperation by a member of a panel of experts interviewed by STEEL. He continued: "There's devastating potential in chiseling a price or granting a price concession. Unless a sound profit return or a cost cut sparks the moves, ramifications of the acts can slug his company, an entire industry, even the economy."

Unfortunately, a panel member in another city later accused that man's firm of being one of the most notorious price fighters in the industry.

What's missing in that character revealing vignette? It's the attribute variously described as moral fiber, courage of convictions, or, as Mr. Adamic put it, "guts."

• **What's Needed?**—STEEL panelists say: Let's reaffirm basic values in business. The impetus must be provided by top management. Look first to your pricing policy. "It should be guided by purpose, planning, and method—not by hunches, emotions, or misinformation," says Fred C. Foy, chairman, Koppers Co. Inc., Pittsburgh. Is the price decision considered in light of marketing goods, recovering costs, generating return on investment? Is it consistent? Does it foster long term growth? Will the earnings attract investor interest?

Remember: Products, service, and ideas are about all anyone has to sell. Each one has a market value. If you cut the price—you erode the value and yet value is the key in the marketing-pricing plan. The responsible businessman does not let the most urgent or imminent factors affect his prices.

Here's an example of what can happen when companies indulge in price fighting: "In 1960, sales in the major appliance industry were down 7.5 per cent," reports John F. McDaniel, general sales manager, Hotpoint Div., Chicago, General Electric Co. "Again, consumers showed that price fighting will not induce them to make purchases—it tends to confuse them. A $100 reduction in de luxe refrigerators failed to stimulate sales."

Appliances weren't the only sufferers last year. Annual statements from a host of industries tell the same sorry tale: Container company—sales up $3 million, earnings down 20 per cent; hand tool maker—sales up 15 per cent, profits down 10 per cent; electronic component maker—shipments up 10 per cent, earnings at 1959 level. The list is nearly endless. The lesson is obvious.

Areas for Courage

Our panelists across the country cited a number of techniques that can be used to improve a company's position without resorting to the sapping tactics of price fighting. If a manager is charged with the accountability and profitability of an operation, he should also have the courage to follow an ethical course in conducting the business of the operation. He must educate his sales and purchasing people about the disastrous results of price fighting and chiseling. He must ride herd on bidding procedures. He must have the guts to drop an unprofitable line rather than prolong its life via price cuts. He must innovate rather than imitate. Every one of those points was touched on and reiterated by the panelists. Most of all they suggested a general spine stiffening among all company personnel.

How can you improve their posture? In many cases, purchasing agents and salesmen are named as the instigators of price warfare. For the most part, venders and buyers are only tacticians involved in minor skirmishes. The real culprits are managers and management practices that foster attitudes which incite price wars.

• **The Seller's Role**—Salesmen and buyers should be allowed to have integrity. One panel member said: "Once a salesman is given permission to sell on price, it's like picking up the dope habit. The first time it is easy; subsequently, it grows easier—soon there's nothing else. . ." Another said: "Salesmen should not be allowed to cut a price to get an order. Every time a price concession is granted, costs have to be refigured—sometimes back to the raw material inventory function. In many cases, if a value were assigned to the amount of work that goes into expediting a delivery, the profit ledger would show a loss."

Nearly all executives agree that a salesman's compensation should be based on profitability, not on volume. The temptation to shade a price is greatest when a volume peddler is told by a buyer: "You're a little high in price. . ."

A written policy often helps combat that technique. Lindberg Engineering Co., Chicago, prints this statement in its quotations:

"It is the firm policy of Lindberg to quote the lowest possible prices on original tender. No representative of the company has authority to make any price reductions. Such a policy insures that all customers are treated alike. It also insures that high standards of quality maintained by the company are never reduced."

Price isn't always the lure that attracts buyers. J. W. Lindsey, vice president, purchases, Jones & Laughlin Steel Corp., Pittsburgh, says: "I'm always preaching to our buyers that competition is more than price. Look for competition of ideas. If a seller has a new gadget, design, or concept—listen to him and evaluate its worth in terms of use rather than price."

Price alone won't help a buyer's company do a better job. One company sells on the basis of customer service and technical assistance. Another stresses reliability. The lesson: Sell your hidden extras. Pick your firm's strong points and sell them, not price.

"It is the wise seller who bases his prices on achieving an adequate profit," says David S. Gibson, vice president, purchases, Worthington Corp., Harrison, N. J. Here's one good reason: "Research and associated activities will be the mainspring of industrial growth and progress in the coming decade," says Robert E. Lewis, president, Sylvania Electric Products Inc., a subsidiary of General Telephone & Electronics Corp., New York. "From now on, business growth and success will be determined by the creation of new concepts in products, not the rehashing of old products. . ."

• **The Buyer's Job**—What about the role of the purchasing agent? Mr. Gibson says: "Price wars are started by sellers who do not have the strength of their convictions to sell their products at a firm competitive price which will permit them a reasonable profit. Price wars are vexing to a purchaser; he can't be sure of the proper market price. It is a buyer's job to spend his company's money for a product at the best evaluated price, from well established suppliers, who can meet specifications and render good service. . ."

If a buyer is a known price chiseler, he may be educated in nonprice values via a grounding in the materials management function. He'll soon learn that price can be minor when weighed against reliability and other important material considerations. Bonuses also may feed chiseling. A purchasing agent's bonus should be based on more than dollars and cents saved. (Some companies equate performance with price buying because numbers are available and easy to evaluate.) It's usually better to put emphasis on the buyer's total performance. Among other rating factors, include price consciousness, but point out that it is only one note in an entire chord.

Bidding procedures also require scrutiny. "We use a bidroom when there are two or more bidders," says John Howell, purchasing agent, Republic Aviation Corp., Farmingdale, N. Y. "Everyone is sent identical request forms. They are returned to a bidroom, not to the buyer. All bid information is withheld from the buyer until all bids are received or the bid deadline date is reached. Republic never discloses quotations to any bidders. Without a bidroom, the buyer would get bids sporadically, and his integrity could be questioned even though his conduct had been completely ethical. Benefits: No basis for complaints, better supplier relations, and no disclosure of bid information."

• **Courage for Surgery**—Another important aspect of business which calls for courage—dropping unprofitable lines.

In announcing that Hoffman Electronics Corp., Los Angeles, would no longer produce home television sets and stereo phonographs, H. Leslie Hoffman, president, said the company could not "build traditional Hoffman quality into those products to sell at prevailing prices and still obtain a proper profit on our stockholders' investment."

• **What Can Be Done?**—"Private enterprise must not be deprived of the opportunity for a sufficient margin between sales and costs—sufficient profit—to attract investment and to provide money that can be retained in the business for improvement and expansion," says Robert S. Meighen, vice president of sales, Weirton Steel Co., Weirton, W. Va., a division of National Steel Corp. "Higher sales alone cannot be the answer . . . many companies now show higher sales on the top line and shrinking profits on the bottom line. . . We must find ways to halt further upward moves in costs and find ways to reduce present costs. Any other course simply means more inflation. . ."

James J. Nance, president and chief executive officer, Central National Bank of Cleveland, comments: "Business statesmanship is the responsibility of industry leaders. Pricing is a tool. It can be

Cost Cutting Plans Bolster Pricing Courage

ONE WAY to make it easier to be courageous about pricing is to institute a cost cutting program that will back your stand. That's the position taken by Fruehauf Trailer Co., Detroit. While competitors are claiming they'll have to raise prices as soon as feasible, Fruehauf has reduced list prices $140 to $745 on four of its most popular vans.

William E. Grace, Fruehauf's president, says that when gross profit margins rise above a certain point due to cost reduction programs, the company will reduce prices again so customers can share the benefits. It has trimmed list prices better than 10 per cent in the last three years. Asserts Mr. Grace: "We hope this new philosophy will help halt the upward spiral of prices, benefit our national economy generally, and furnish new impetus to the transportation industry."

Beginning in 1956, the company embarked on a program aimed at boosting productivity through more effective utilization of plants and equipment.

Robert G. Flagan, director of research and engineering, observes: "For about the last four years, we have been analyzing our trailer designs and our manufacturing facilities to make sure they fit the market, materials, processes, and equipment that we are dependent upon and have available."

Results: "We didn't accomplish all this at once, but now a high percentage of our parts can be made either in steel or aluminum, depending on customer requirements," says Neal H. Gammell, director of manufacturing. Facilities for manufacturing are better integrated, and inventory control is easier now because a smaller variety of parts is needed.

"Price reduction in phase with product improvement and reduced manufacturing cost is a continuing goal for us," comments Keith Tantlinger, vice president of engineering and manufacturing. "As we lower our manufacturing costs and increase our capability to produce through sensible product simplification and interchangeability of components between product lines, mutual benefit to our customers and to Fruehauf is the inevitable result."

Examining a steel locking device, used on new, standardized shipping containers, are key men in Fruehauf's attack on costs: Keith Tantlinger, (seated), Robert Flagan, (center), and Neal Gammell

used to gain entry into an established field. It can be used to increase volume. It takes irresponsibility or ignorance to cut prices without knowing costs or profit return."

You Can Sell Better

"All other things being equal, the guy with the lowest price gets our business," the buyer told STEEL.

It was the same thing he had said many times to his suppliers. Some had reacted by cutting prices —selling their wares at little profit or none. Others had weighed his words and realized that they had an alternative. They sold him by making the "other things" more than equal. And they sold him profitably.

The "other things"—over-all costs of using the product, quality, service, terms, and reputation of the seller—are as important as price. What venders really sell is value, the sum of a product's attributes. Price is just one element in the formula for costs.

In picking a vender, the purchasing vice president of a leading steel company says he considers these factors, in the order listed: "1. Suitability of the supplier's material for our needs on a value analysis basis. 2. Service and availability. 3. Cost—in light of our requirements, processing facilities, and end use. 4. Over-all efficiency of the supplier's operation."

Executives surveyed by STEEL rank price as a major item in vender selection, but they often make it the last consideration.

- **Sell Functions, Not Products**—Buyers are more knowledgeable about products and product applications than they used to be. Arthur J. Tracy, marketing consultant for General Electric Co., concludes: "Salesmen have to sell the function—not just the hardware."
- **Costs, Not Prices**—If you know your customer's business well enough, you can probably design a

What You Can Sell to Minimize Price

COSTS

Show how your product will save money in the long run. If it's easier to install, its in-place cost may be less than that of a low priced competitor. Stress high output, close tolerances that minimize rejects, long life, and low upkeep. Maybe two of your widgets will do as much work as three of rival design.

QUALITY

Show that your product is best—most suitable for the user's needs on a value analysis basis. Stress its workmanship, appearance, durability, accuracy, versatility, output, reliability, extra features, or ability to cut costs by saving material.

SERVICE

Market your "hidden extras" . . .

- Maintain adequate inventories to provide fast deliveries from your plant, distributors, or factory operated distribution centers.
- Help customers devise economical stock ordering procedures.
- Package and ship your product in the way that's most convenient for your customer. Palletizing may cut his handling and storage costs.
- Provide design, engineering, and metallurgical assistance. Help customers redesign their assemblies so that they can cut material and fabricating costs.
- Offer unique guarantees covering service and replacement of parts.
- Provide sales training for dealer personnel and training courses at customer plants for people who operate or service your equipment.
- Help your customer sell his products—even your customer's customers—through co-operative advertising, promotion, and market research.
- Be willing to accept small orders and specials. You may land the customer's standard business as a reward.

TERMS

Allow only standard discounts for order size and payment; but consider extending credit for longer than usual periods to companies that are just getting started. Can you accept surplus or used equipment from customers as part payment for new machinery of your own make?

REPUTATION

Make the most of your company's good name. It's a powerful asset. Buyers like to identify themselves with the prestige-authority image of industry giants, but they can also think well of smaller companies. Advertise your firm's progressive management, technical competence, sound purchasing, harmonious labor relations, modern facilities, large capacity, and fast deliveries.

product that will suit him better than the one he's using. A higher price tag can be justified by unique features that will save money in the long run—easier installation, higher productivity, longer life, or less maintenance. Examples:

• Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., is demonstrating to customers how two high strength bolts can do the work of three regular bolts and save money.

• A Chicago cutting tool manufacturer declares: "We're convinced that the only answer is to spend more money for research and development. We've got to come up with products which the purchasing agent can't compare directly to those of our competitors."

• Thomas & Betts Co. Inc., Elizabeth, N. J., says its electrical fittings, couplings, connectors, and terminals have distinctive features and are worth more than competing products. Here's how Karl G. Kempf, vice president-marketing, outlines company strategy:

"To compete with an iron electrical fitting with five screws, selling at 9 cents, we will design a steel fitting using only one screw and selling at 10 cents. A contractor can install our fitting in 1 minute while the competitive fitting may require 2 minutes to install. With labor and overhead calculated at 10 cents a minute, our fitting will actually cost a contractor only 20 cents, while the competitive fitting, although selling for less, will really cost 29 cents."

• **Stress Quality**—Another good way to stay ahead of competitors is to constantly upgrade your product—with or without price hikes. That's what steelmakers are doing as they battle each other and counter the inroads of nonferrous metals, paper, plastics, structural glass, and plywood. Recent examples:

• The industry's switch to bright annealing of stainless stock for automotive trim. Type 430 stainless made by the new process has better corrosion re-

The Four Facts of Marketing Life

ARTHUR J. TACY,
Consultant—Marketing Administration
General Electric Co.

We are trying to manage each of our businesses in such a way that everyone in them recognizes the need to take care of the customer's changing requirements. We try to do this by managing in what we call a customer-oriented way—or, a little more formally, in what we call the marketing concept.

We think the first requirement in living up to this philosophy of customer orientation is the right state of mind.

A second requirement is knowledge—knowledge of precisely what the customer considers to be value. We hope and believe that we understand four basic facts of life:

1. **That our customer's verdicts—for us or against us—will depend not on our appraisal of the value of our offerings to him but on his appraisal.**

2. **That our customer's ideas of value change with his shifting circumstances. We must keep abreast of these changes and strive to anticipate them.**

3. **That our competitors can raise hob with our customers' ideas of value, and that when competitors are hurting, they tend to use the easiest thing to tinker with—price.**

4. **Value, in the customer's eyes, is not only product, not only service, not only price. It's the combination of all three and includes such important items as: Performance, safety, pride of ownership, delivery and installation, reputation of the manufacturer, service after the sale, and terms of payment.**

   All of these are harder, yet more profitable, to utilize than the final one—price.

By striving for this right state of mind and always considering these four basic facts of life, we are constantly trying to achieve a much greater degree of customer orientation.

sistance than material that's annealed and pickled in the conventional manner. It retains its bright finish after stamping, doesn't require a lot of buffing, and—best of all—costs no more than the material it's displacing.

• Development by Universal-Cyclops Steel Corp., Bridgeville, Pa., of a new, free machining stainless grade—Uniloy 303 MA. The company claims that reduction of sulfur content and addition of aluminum permit faster machining, longer tool life, better finish, and improved corrosion resistance. Although the product is priced about 2.5 cents a pound above Type 303 stainless, its higher tab is "no deterrent at all," says William G. Stewart, president.

• **Broaden Services**—The possibilities for winning customers through expanded service are almost limitless (see checklist, Page 73). The increasing emphasis on service is a natural outgrowth of the marketing concept that evolved in the midfifties. Chief characteristic: A 180 degree twist in corporate emphasis—from industry orientation toward customer orientation (see above). Here are examples of what's being done.

• Aluminum Co. of America and U. S. Steel Corp. are striving to expand their markets by helping major consumers make optimum use of their materials. They're sending application research engineers around to customer plants with instructions to help designers, engineers, and production men solve fabricating problems and specify the materials that will serve them best.

• Republic Steel Corp. is conducting training programs for its distributors' salesmen. In its Order Makers Institute for stainless steel distributors, inaugurated last year, the company is sponsoring a series of nine product education and sales conferences, presented four to six weeks apart.

• Studebaker-Packard Corp.'s Onan Div., a Minneapolis based producer of electrical generating equipment, engines, and automatic line transfer controls, has broadened its services by: 1. Setting up a

business management service for its distributors. 2. Upgrading its customer service department. 3. Stepping up the tempo and frequency of service schools for distributors and distributor salesmen and advanced schools for zone managers, regional managers, and department heads.

• Champion Rivet Co., Cleveland, has established an inventorying program in which it stocks more than 100 types of rivets. It can ship standard rivets on the same day that an order is received. On specials, it's offering three day service.

• **Make It Easy to Buy**—Taking a page from consumer marketing techniques, Pratt & Whitney Co. Inc., West Hartford, Conn., will give customers trade-in allowances. Paul N. Stanton, vice president-marketing, says a new branch of the company will accept used or surplus machine tools of any make as part payment toward the purchase of new P&W products.

• **Capitalize on Names**—Don't underestimate the importance of a good name—be it your company's, or that of a renowned executive—in selling against price cutters. A reputation for progressive management, technical competence, successful products, and dependable service weigh heavily with prospective buyers.

Controls Co. of America, Schiller Park, Ill., gained entry into the crowded, competitive, semiconductor market by capitalizing on the recognized stature and capabilities of one man.

Instead of trying to win a place for its newly formed Electron Div. (Tempe, Ariz.) via price concessions, the company hired Dr. Friedrich W. Schwarz, a recognized authority on semiconductors and other areas of electronics, and put him in charge of the division.

"Our strategy was to prove to potential customers that we did indeed have unique skills in this area," says Charles Stainton, vice president and director of marketing. Methods: Dr. Schwarz conducts seminars in the plants and offices of prospective customers. He gives managers, engineers, and purchasing people knowledge in areas beyond, but including, those in which the Electron Div. is attempting to sell products.

Adds Mr. Stainton: "Since other firms can make anything we make—or something quite similar—our approach is to contribute additionally to the value of the customer's product."

• Bound reprints of the study on Price Fighting are available at $2 a single copy; prices for larger quantities on request. Write Reprint Dept., STEEL, Penton Bldg., Cleveland 13, Ohio.

We Have So Much More than Price to Sell

FRED C. FOY,
Chairman, Koppers Co. Inc.

To put all of our competitive eggs into the price basket is shortsighted at best and suicidal at worst.

We have so much more than price to sell—design and application features . . . availability . . . quality . . . convenience in use . . . modern packaging . . . and more. Those are real values and competitive factors. Most of them are as important or more important than price in creating demand. Compare, if you will, the frozen foods and ready-convenience items of the modern supermarket with the bulk foods of the cracker barrel store. Clearly, to millions of consumers, the new elements of use value have proved to be more attractive than price.

The most serious shortcoming of price-only competition is that it inevitably results in a slowdown or stoppage of growth. This can be true not only for a particular industry but for the nation's economy as a whole. The early automobiles might have been sold for considerably less than they were. But I suspect that if the automobile industry had tried to develop its markets on price alone we would still be driving a variation of the Model T.

BECAUSE YOUR TEST NEEDS ARE DIFFERENT!

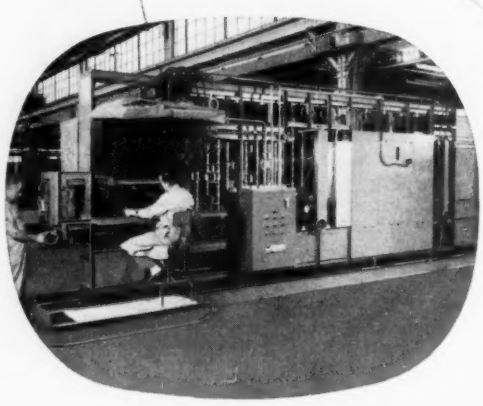
...from MAGNAFLUX you can find many engineered nondestructive test systems*, to meet widely different needs...as near as your telephone.

Only the widest *range* of test systems can assure you of getting the one *best* answer to your own "different" test problem. Several examples of the many ⋈ tests are shown at work on the next page.

The intensive problem-knowledge of the Magnaflux Field Engineer goes to work for you immediately. He qualifies as an impartial, expert counsel because he has thorough training in practically all wide-used nondestructive test systems. (Actually, we offer scores of systems, methods, test services, instruments and custom-engineered units. Magnaflux originated most of 'em and has been improving them ever since.)

Further, he wires you into more nondestructive testing know-how than you're likely to find anywhere else. He's backed, for instance by many hundreds of man-years of experience in field application and of design and project engineering. *Plus* a big department-full of far-reaching research. *Plus* the up to the minute knowledge gained in operating our own fifteen Commercial Testing Centers in principal cities, where the "unusual" tests occur almost daily to meet hundreds of differing needs and specifications.

At Magnaflux you find maximum nondestructive testing assistance—in equipment, men and experience-based understanding of your needs and problems. May we put it all at your service—SOON? Phone your local Magnaflux Field Engineer, or write us. Magnaflux Corporation, 7312 W. Lawrence Avenue, Chicago 31, Illinois.



TESTING BEARING CAGES with ZYGLO fluorescent penetrant. This Zyglo ZA-49, equipped with an endless conveyor, provides mechanized, high volume testing of nonmagnetic parts from ¾" to 10" in diameter. All processing is fully automatic, assuring predetermined control and repeatability of results.

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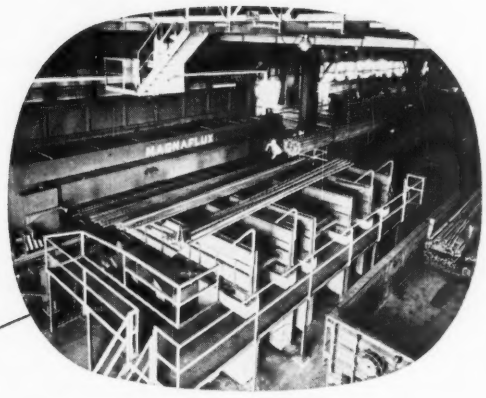
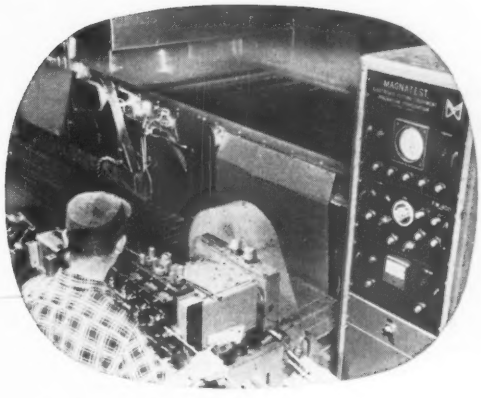
TEST SYSTEMS
A SUBSIDIARY OF GENERAL MILLS

*MX test systems include MAGNETIC PARTICLE, FLUORESCENT PENETRANT, THERMOGRAPHIC, EDDY CURRENT, ULTRASONIC, STRESS ANALYSIS, RADIOGRAPHIC TESTING, DYE PENETRANT & MAGNETIC FIELD

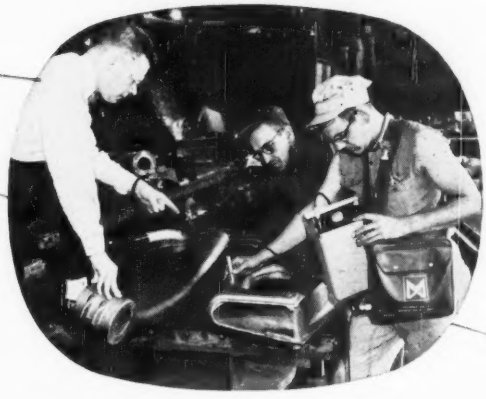
A Few of Thousands of ⋈ Test Installations at Work—Could One of Them Help You?



BILLET CONDITIONING SYSTEM
Mechanized, ⋈ engineered inspection and handling provides more control, better quality level, and lower costs from conditioning. MAGNAGLO, electronic eddy current, ZYGLO fluorescent penetrant testing, for billets, tube rounds, welded and seamless tubing and pipe.



TESTING COPPER TUBING ELECTRONICALLY
with MAGNATEST FW-400, for cracks and seams at production speeds. Many kinds of MAGNATEST instruments, hundreds of applications: determining metal properties, defects, characteristics, sorting, etc.



TESTING THICKNESS ULTRASONICALLY
for core shift of castings, or almost any solid material, from .025″ to 3.00″, for thickness, corrosion, etc., from one side only. Portable transistorized SONIZON SO-300 gives instant dial readings, accurate to ±1%. Magnaflux Field Engineer instructs in operation (above).

TESTING JET ENGINE
turbine wheels electronically for serration cracks, with MAGNATEST ED-500G, eddy current instrument. Magnatest units measure relative depth of cracks, electrical conductivity, evaluate metals for all sorts of basic or process-built characteristics.

RADIOGRAPHIC TESTING
of boiler tubes with gamma radiation isotope. X-ray and gamma radiography service available at several locations. Performed by certified technicians and engineers at your plant or at your local ⋈ Commercial Testing Center.

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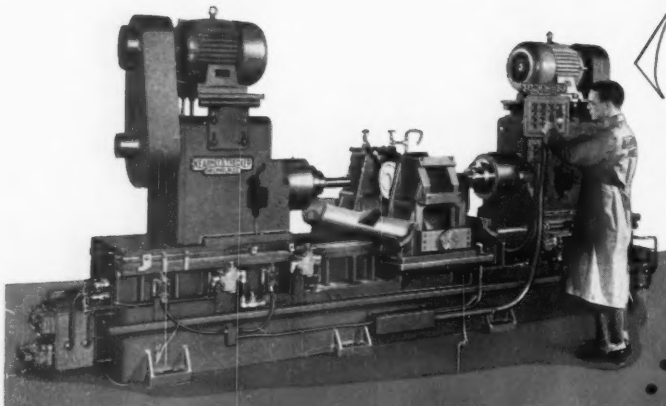


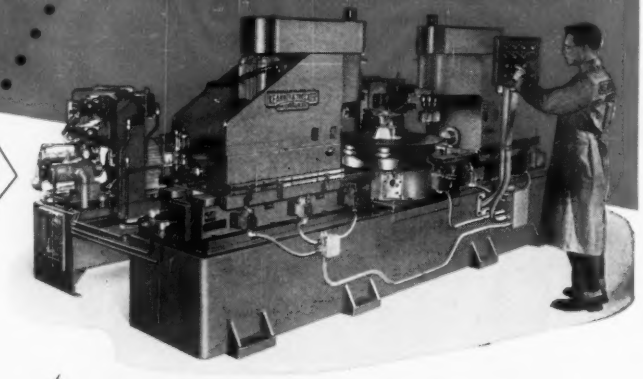
CONSTRUCTION INDUSTRY

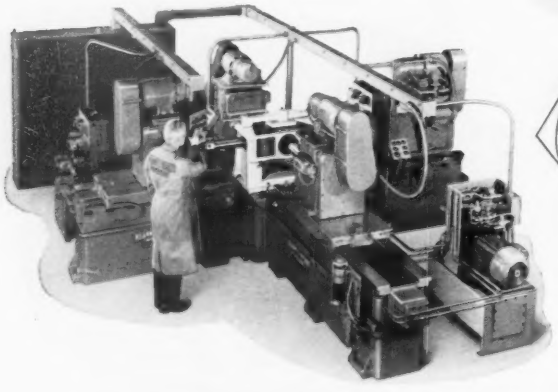
Only one setup is required to rough and finish bore, finish counterbore and face both sides of a tread roller for tractor-type construction equipment. Workpiece is hydraulically clamped . . . seven sizes of rollers can be machined. This method replaces a turret lathe using two setups. New rate is 13 pieces per hour.
Production up — 100%.

Kearney & Trecker builds PRODUCTION MACHINE TOOLS FOR EVERY INDUSTRY

AIRCRAFT INDUSTRY

Rotary feed, bed-type machine with two opposed vertical spindles mills both sides of aluminum pump body flange to critical thickness and smooth finish *at rate of 76 pieces per hour.* Unit is versatile . . . as many as eight types of pump bodies are milled using only separate fixtures and cams.



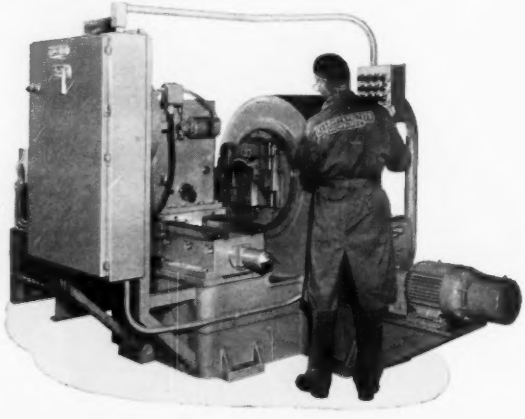


ENGINE INDUSTRY

This unit bores four holes in engine block simultaneously . . . replaces horizontal milling and boring machine that worked just one hole per setup. Interchangeable inserts allow operations on any of four different workpieces. One feed slide unit handles interchangeable heads.
Production — 10 pieces per hour . . . up — 400%.

ELECTRIC POWER INDUSTRY

Two-spindle machine mills both inside and outside radii of curved alloy steel turbine blade section in a single pass *at three times the former feed rate.* Versatile 360° drum fixture handles 81 different blade sizes without overtravel on rapid stroke for extremely short cycle time.
Production up — 300%.



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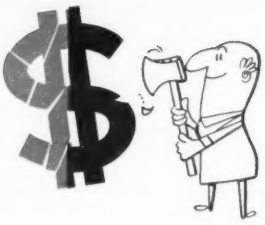
SINCE 1898 . . . *Kearney & Trecker Customer Engineering Service — supported by an outstanding staff of engineers experienced in production milling machine design and application — combined with the finest and latest machine tools in an ultra modern plant, is always ready to solve your production problems.*



Let's Start Economic Price Cutting

CUMMINS Engine Co., Columbus, Ind., has reduced prices and posted excellent earnings, despite rising labor and material expenses.

Its composite price decline amounted to 1.6 per cent of net sales in 1960 and 1.5 per cent in 1959. The reduction will be about 1 per cent in 1961.

That's economic price cutting, made possible by efficiencies gained from new machinery, design improvements, and a generally aggressive cost reduction program. It's a far cry from price fighting and helps to stimulate both sales and profits, as these Cummins figures prove:

	Consolidated Net Sales	Net Income
1960	$135.8 million	$6.0 million
1959	147.0 million	8.2 million
1958	108.8 million	3.9 million

Economic price cutting (a reduction made possible by cost cutting) has made the U. S. grow. Price fighting (a reduction made without regard to costs) can have the opposite effect.

Henry Ford's greatest economic contribution was not the Model T. It was his estimate of what large numbers of Americans would pay for a car. The design of the Model T and the manufacturing techniques to produce it came in the effort to produce a vehicle that would sell with profit at the target price.

Such economic price cutting works today just as well as it did in 1908 when the Model T was introduced. The job now, as then, is to know how and where to cut costs.

"The inability to control costs during the 1958 recession came as a rude shock to many companies," points out Dr. Jules Backman, research professor of economics at New York University.

The result was panic cost cutting that often did more harm than good—many of the "eliminated" costs had to be restored. But before they were, some prices were cut where costs were mistakenly believed to be lower. STEEL's checks with nearly 100 companies reveal that cost reduction is being approached more cautiously in 1961 than it was three years ago. Metalworking managers suggest four ground rules to meet the cost challenge:

1. Give higher priority to the long term effect of a cost reduction than to any immediate result.
2. Review costs regularly, not just sporadically.
3. Start any blood letting at the top and work down, not vice versa. Top management should supervise all cost reduction programs.
4. Let the employees know what you're doing and why. Let them know promptly.

Cutler-Hammer Inc., Milwaukee, has a formal cost reduction program ideal in metalworking. It believes that the job is a line responsibility. But a staff group, a cost control department reporting to John C. Borden, vice president and controller, is

Ten Commandments for Savings Seekers

1. Thou shalt get everyone into the act.
2. Thou shalt work at it always, for such is the way to success.
3. Thou shalt recognize that opportunities to cut costs exist wherever there are costs.
4. Thou shalt concentrate thy efforts where the rewards are greatest.
5. Thou shalt seek first to eliminate, then to combine, then to simplify, reduce, or change.
6. Thou shalt seek always to rapidly apply new materials and production processes.
7. Thou shalt learn and apply the concept of automation.
8. Thou shalt strive to keep thy hands off the materials.
9. Thou shalt standardize where practical.
10. Thou shalt challenge tradition and hold no method to be sacred.

How GE Cut Transistor Prices 41%

"At the new price, we expect the immediate market potential will be increased by five to ten times" — H. Brainard Fancher

THE CONSUMER has received a 41 per cent price break on unijunction transistors, thanks to manufacturing improvements at General Electric Co.'s Semiconductor Products Dept., Liverpool, N. Y. It was a price cut in the best tradition, brought about by lower costs, not by arbitrary actions.

"We felt that our old price range of $3.05 to $3.64 was limiting the market for these new elements—even though each one could replace up to four conventional switching transistors," explains GE's H. Brainard Fancher, general manager, Semiconductor Products Dept.

"Our answer had to be reduced costs, and the reductions had to be large enough for us to pass a substantial price reduction on to the customer while permitting us to produce at a profit. Improvements in production processing held the key. We now get 14 completed transistors off the line in the same time that we used to get ten. And we've cut our reject rate in half. Also, the improved quality has given

the catalytic agent, co-ordinating and suggesting projects, helping to train foremen and others to meet their cost responsibilities.

Summarizes Mr. Borden: "Annual savings (in our program) are between $500,000 and $700,000 a year for each year we are working on cost reduction projects. This might seem fantastic if you could continue to add this amount of savings each year, but we usually figure that savings are not going to last much longer than three years, due to changes in design and obsolescence."

Where do you look for cost saving potentials? All agree that people's efficiency should be improved, that paperwork should be reduced, that more standards should be set. But where? Twelve of 98 respondents say those and other paring programs will get best results among clerks and other indirect workers. Seventeen believe that no special department or employee class should be singled out; all should be scrutinized. Thirty-one think marketing provides the most promising opportunities. Thirty-eight suggest that production still presents the worst bulge in the corporate body.

Because production is the winner (or loser), we'll devote the rest of this section to ways that part of your business can best be streamlined—with better use of machinery, methods, and materials.

Challenge from Machinery, Methods

"We—in business—have a mandate. We share with the new administration the obligation to play our full part in keeping America strong, secure, dynamic, and free. When we ask ourselves how to discharge this mandate, there is, to me, but one answer. We can do this only if we improve our competitive position, and our competitive potential, with the greatest possible dispatch."

So declared Roger M. Blough, chairman, U. S. Steel Corp., to members of the Illinois Manufacturers Association. Mr. Blough pointed out that U. S. industry must continually seek new methods and production innovations if it is to regain its potential portion of domestic and foreign markets.

Mr. Blough hurled the challenge. U. S. industry can be competitive—without resorting to unsound price cuts—if management devotes enough attention to the methods and processes that will reduce costs.

The Big Payoff

Republic Aviation Corp., Farmingdale, N. Y., saved $47 million (about 32 per cent of the on-site costs) in 18 months on its F-105 defense program. Result: The unit price of the Mach 2 fighter-bomber

us better electrical characteristics and a more uniform and stable product," says Mr. Fancher.

The customer will now pay $1.80 to $2.15 for the units.

● **Three changes in manufacturing cropped the cost.** First, engineers came up with a new surface treatment for the device prior to capping. Similar processes had been tried before but with poor results. This time, however, new chemical solutions brought about faster operation, giving increased productivity.

Second, a better assembly was added inside the transistor cap to maintain the water vapor pressure of the sealed unit at extremely low and constant levels even at high operating temperatures. This improved the unit's stability and gave it better low temperature performance.

Those two changes mean: 1. Emitter leakage current was cut 0.05 microampere to about 0.0002 microampere at 77° F. 2. Emitter saturation voltage was cut from about 3.5 volts to about 2.5 volts. 3. Peak point current was slashed from about 4 microamps to about 0.7. That, plus high trigger current, makes the unijunction transistor an extremely sensitive switching device.

The third improvement was mechanization of part of the fusing operation. Individual emitter leads had been hand loaded into the fusing equipment. Now the leads are fed continuously from a spool. Engineers designed a needle which permits threading for continuous feeding and which has enough friction to permit correct placing of the lead during operation.

was $450,000 less in the 1960 contract than in the 1959 one. The reduction came from an integrated program of equipment improvements, methods studies, engineering analyses, scheduling and workload controls, and analyses of tooling, quality control, maintenance, and purchasing.

Emerson Electric Mfg. Co., St. Louis, has a programed war on costs that has contributed more than half the firm's net profits in recent years. In 1959, for example, cost reduction through product redesign alone accounted for 34 per cent of the firm's net earnings. It has been able to reduce prices on some of its products while improving its net profits (4.3 per cent of sales in 1959 vs. 4.8 per cent of sales in 1960).

Those two examples typify the "sterling approach" to price competition. Prices are reduced by management attention to costs, not to competition alone. The customer benefits—so does the manufacturer.

General Electric Co., for example, has conserved $130 million in U. S. defense funds since 1958—via cost reduction programs on military products. The prime methods used, says C. W. LaPierre, GE vice president, are automation (in purchasing, manufacturing, and accounting), employee suggestions, the techniques of value analysis, assistance to subcontractors in reducing their costs, task forces and study groups, and a myriad of approaches to trimming unit production costs.

Nickels & Dimes Make Dollars

You frequently hear a successful cost reduction effort dismissed as "fine, but not really too important in the over-all picture." Such statements often reflect the speaker's feeble grasp on the over-all picture. Remarks like his are a prime influence in holding cost cuts at an insignificant level because they discourage the idea man from striving for even better future results. And statements such as his generally are not true; his thinking probably isn't high enough in caliber to see the aggregate of such efforts.

For example, in one GE department, $2.6 million was trimmed from costs during the first half of 1960 and nearly half of that was made up of innovations worth less than $1000 each. Documented reductions of $17.7 million in another department resulted from 2500 employee ideas. For example: $3.77 jet engine compressor blades were trimmed to $1.96 each. The reduction results in savings of $7327 on a B-58 bomber (each of its four engines takes 1012 such blades).

So don't lightly dismiss seemingly insignificant cost cuts. They may be the reason your competitor can underprice you. Of course, it's wise to first tackle the areas that offer the most potential—but don't stop there. Bendix Corp. didn't. It has closed two entrance gates at its South Bend, Ind., plant to save guard expenses. Nor did Sandia Corp., Albuquerque, N. Mex. Its administrators and scientists now ride bicycles from building to building instead of using company cars. And American Building Maintenance Co. reports that many plants are getting by with three janitorial visits weekly, instead of five.

Enlist Aid of All

"You are the manager of a business; now manage it to stay in business," wrote Morton M. Schwartz, president, Olympic Radio & Television Sales Corp., to all his district and branch managers. The letter outlined nearly a dozen ways to save money. Mr. Schwartz's goal is a 10 per cent reduction in general and administrative sales expenses this year.

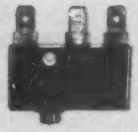
His philosophy is as sound as a Deutsche mark. And it can be applied almost anywhere. Why not put the machine operator "in business for himself" by giving him responsibility for cost reduction at his work center. That's the philosophy of Allan H. Mogensen, the father of work simplification, who teaches managers to get their employees to work smarter, not harder. It's an unenlightened manager who fails to utilize the whole man. At today's high employment costs, it makes good sense to use a man's brain as well as his brawn.

So the first commandment of cost reduction is *"Thou shalt get everyone into the act."* The second commandment is, *"Thou shalt work at it constantly, for such is the way to success."*

When sales and profits began to fall off last year, many companies set up special committees to in-

"You can't start with a sow's ear and continually adapt it to new uses until you wind up with a saddle. If you do, you're likely to have a mighty expensive — and peculiar looking — saddle. At some point, with the proper volume, you must redesign completely." So says D. M. Strathearn, general manager of Controls Co. of America's Appliance & Automotive Div.

NEW



28 parts make 9 switches

(Instead of molding the cover in two halves, it's one piece. And instead of individually stamping the components, the "insides" are stamped in one piece)

OLD

126 parts made 9 switches

(The old unit is shown here in progressive stages of completion—starting with the 14 parts at far left and ending with finished switch at far right)

vestigate untapped possibilities for savings. In many cases, the recommendations have only recently been made—and by the time the savings are achieved, management will have turned its attention to the sales upcurve. Meanwhile, their better organized competitors were reaping continuing rewards.

The savings seekers' next commandment is: *"Thou shalt seek first to eliminate, then to combine, then to simplify, reduce, or change."*

Friden Inc., San Leandro, Calif., sought first to eliminate—and did. It has saved $7000 annually by eliminating a taper reaming step in making calculator counter dial shafts.

The Automatic Enterprise

"Thou shalt learn and apply the concept of automation," is another commandment for cost trimmers. Let's have Harvard's Prof. James R. Bright explain it (as he did in the November-December, 1960, issue of *Harvard Business Review*).

"Five years ago, I suggested that the average factory was a primitive machine—no more than a crude assemblage of unintegrated bits of mechanism. I argued that 'automated' factories were not as conceptually advanced as they seemed but only represented the beginning of machinery evolution on a grander scale. We were shifting from 'the collection of equipment for a production sequence' to the 'synthesis of a master machine.' What I underestimated was the speed with which the computer would outmode the concept of a factory as a mechanism in itself. The computer has increased the possibilities of unification and integration to an amazing extent. The unit of mechanization will be the total business—not the factory and the office as two separate spheres.

"The new age has the effect of forcing management to assume the role—conceptually—of a 'machine designer.' This master machine of business must fit an environment that has three dimensions: Technical, economic, and social. What is more, intelligent 'design' requires the integration of manufacturing, marketing, distribution, procurement, product design, and administrative activities. A team approach therefore is essential, and sophisticated tech-

FEW AREAS of industrial endeavor offer greater opportunity for the application of ingenuity than product redesign. Exceptional ability at that task can give you a decided advantage.

Such has been a path to success for Controls Co. of America, Schiller Park, Ill. It has redesigned a steady stream of products to lower costs (and thus prices) and to improve quality and dependability.

Take, for example, the snap switch illustrated at left. Appliance manufacturers used to buy off-the-shelf switches that were not designed for their tasks. In many cases, the items were more expensive than they should have been. So Controls Co. designed a switch to exactly fit the need of the home appliance industry. The price was lower and the function was performed equally as well.

Then technical advances in Bakelite molding and automatic assembly permitted redesign for lower costs. So Controls Co. invested $35,000 in tooling (vs. $15,000 in the conventional method), and redesigned the switch for automatic production, automatic testing, and automatic adjustment. Costs were lowered; reliability was improved (machines make fewer errors than people in this area); and production capacity was hiked from around 8000 units daily to nearly 20,000 daily.

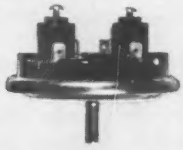
The selling price, on volume orders, was reduced 20 per cent. Profit levels were maintained at a respectable point. Now the customer gets a better part at a lower price—and Controls Co. enjoys a competitive advantage.

Advises Don Strathearn, general manager of the firm's Appliance & Automotive Div.: "To properly trim costs, you must place your emphasis correctly. Investigate the reasons for the existing cost. If material seems too high, concentrate there. If processing is the culprit, attack it. If it's overhead, or engineering, work in those areas."

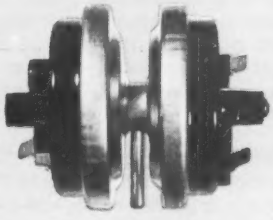
Another example.....

Controls Co. redesigned the liquid level switch for automatic washers. The new unit is about one-third the size of the old one. It gives the customer easier assembly, greater design flexibility, and lower weight—at the same price as the old unit. Material costs are the same; processing costs are about 10 per cent less. But a sizable investment in equipment equates the processing savings. The firm makes 2.5 million to 3 million of the units annually

NEW DESIGN



OLD DESIGN



niques like simulation are necessary to explore complex relationships in planning and scheduling."

'Seek and Thou Shalt Find'

"Thou shalt recognize that opportunities to cut costs exist wherever there are costs," is also part of our decalogue. So we won't pretend to cover all the possibilities in this article; for example, you can get ideas from every weekly issue of STEEL. For now, let's examine some of the areas that offer the greatest potential . . .

Numerical Control

"Thou shalt always seek to rapidly apply new production process." Remember, for example, that 80 per cent of all machined items produced in the U. S. are made in lots of less than 20, so seek to apply numerical control.

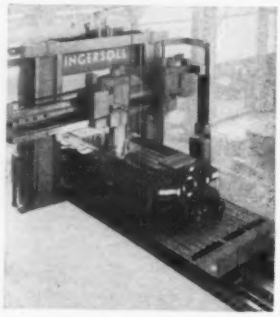
Numerical control's eight principal advantages are pointed out by Republic Aviation Corp.

• **Tooling**—Intricate and cumbersome guiding templates, cams, and models are replaced by tape. Additional holding fixtures normally required with conventional machines may be eliminated due to greater machining accuracy and versatility. The programming costs of the tape are often less than half the cost of designing and fabricating the guiding models. Duplicate tapes are made in about 1 per cent of the time required to duplicate conventional guiding devices. And righthand and lefthand parts (common to airframe structures) can be made from the same tape with the flip of a switch. So leadtime can be reduced considerably.

• **Machining Time**—Since the cutting cycle is almost entirely automatic, machining time may be reduced by 65 to 85 per cent—or more—when compared with conventional methods.

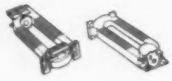
• **Quality**—Quality and uniformity are greatly improved. With numerical control, the operator need not make (or fail to make) periodic checks and adjustments; the cutter moves along a precalculated, uninterrupted path. The number of check points requiring inspection on any part is reduced by about

New Machine Saves Time, Lifts Quality



BEFORE: Five setups needed

NOW: Only two setups



ONE SOUND WAY to counter price fighting is to offer the customer bigger benefits in other areas. Rapid delivery and higher quality stand out. That's the approach United Engineering & Foundry Co.'s Youngstown plant has taken.

A new giant milling machine has permitted the firm to reduce the number of setups from five to two in machining large, multiton, rolling mill housings.

The benefit is pointed up by Paul M. Thompson, plant superintendent: "We used to have to quote a 14 to 16 month delivery on big mill stands. Now we can give much faster deliveries (usually 10 to 12 months). The new milling machine gets most of the credit."

● **Housing machining was the bottleneck.**

The machining job had been done on a pair of large, vertical column milling machines. The workpieces were positioned and then machined in five different setups. That was the big time consumer.

Now, on the big milling machine, the operator completes five of the housing sides in the first setup; the part is turned over and the last side is completed.

Machining time has been nearly halved.

● **Quality is easier to maintain.**

To get a close tolerance housing under the old method, machinists had to cut and measure, then cut and measure some more. It was a tailoring process.

Now, says Mr. Thompson, the close tolerances come as a routine part of the machining job and the painstaking cut and check steps are gone. "We're convinced that we're shipping a better housing than we could before," he says. Machining tolerances are close over the entire surfaces of the vast part.

65 per cent, says Republic, thus bringing big savings in quality control.

• **Tool Storage**—Large templates and models are replaced by punched tapes about 3 in. in diameter. So tool storage can be cut 80 per cent or more.

• **Tool Handling**—The time required to thread the tape at the machine is generally less than the time it takes to thread film on a motion picture projector.

• **Spare Parts**—The high costs involved in tool rehabilitation, transportation, setup, and handling of models and templates for the machining of spare parts is eliminated since tapes can be safely and compactly stored in filing cabinets, says Republic.

• **Lower Capital Outlay**—Since machining time is cut by at least 60 per cent, the investment in equipment may be reduced substantially. To meet its schedule on the F-105 spar cap, Republic would have needed four new conventional machines, instead of two numerically controlled units. The firm saved $420,000. And the two tape units are being used for other work besides. Also saved are floor space and maintenance.

• **Subcontracting Ease**—Tapes can be exchanged by mail, and engineering changes can be incorporated on the tape in a fraction of the time required to change a tool at a subcontractor's plant. Also, the ease with which duplicate tapes can be made facilitates a rapid exchange of production programs, as for example, in case of a national emergency demanding all-out mobilization.

• **Big Savings**—For an idea of the magnitude of savings some firms are making, see the exhibit on Pages 86 and 87.

Material Handling

"Thou shalt strive to keep thy hands off the materials."

Our seventh commandment indicates the economic sinfulness of periodically picking up and transporting an item when it could be done automatically. Management has made great strides in getting materials to the production line. And, more recently, big changes have been made at the end of the production cycle—automatic feeding of materials into packages, use of packaging machinery with automatic closure and labeling, and mechanized feeding to storage or onto distribution vehicles. Some progress has been made in automatic work feeding and in the mechanized movement of materials between work stations.

But management has generally done the job piecemeal. Needed is wider acceptance of Professor Bright's concept. Under it, the flow of material into, through, and out of the plant would be examined as one continuous process.

Such attention could speed the introduction and adoption of new handling and packaging techniques. The cost saving potential is terrific. For example, General Electric's Missile & Space Vehicle Dept., Philadelphia, developed a multipurpose trailer to carry ICBM re-entry vehicles to their missiles that is saving $1.2 million. Inland Homes Corp., Piqua,

Ohio, has built a conveyor system to dip whole sections of houses into a paint bath, saving 25 per cent of the painting cost.

Automatic Assembly

Making a part automatically is relatively easy; assembling several parts automatically is far more difficult. But automatic assembly is a reality in many areas. It's especially striking in the electronics industry. Burroughs Corp., Detroit, for example, redesigned its miniaturized memory cells (Bi-mags) and developed special machines to aid in assembly. Unit cost dropped from $4.73 to $1.51, and output zoomed from 2000 to 16,000 parts weekly.

Other examples: Daisy Mfg. Co., Rogers, Ark., automatically assembles the shooting mechanisms on its BB guns. And the BBs are also packaged automatically. Caps for Parker Pen Co.'s T-Ball Jotters are automatically assembled on a machine that is expected to pay for itself in 18 months.

Machines can replace costly and error-prone people in numerous tasks—cleaning, finishing, joining, testing, inspecting, and others. In testing, for example, Texas Instruments Inc. has designed and built a centralized, automatic, recording and testing machine (called Cart) that creates environmental conditions and automatically tests and records device parameter values for reliability analysis and evaluation. "Cart" can subject transistors and other items to environmental conditions ranging from room temperature to above 300° F and can test 1200 to 1600 units an hour for ten different parameters.

Warner & Swasey Co., Cleveland, pretests electrical control panels for its single spindle bar and chucking automatics with a numerically controlled inspection machine. Total time to inspect the two panels that go on each machine tool is only 15 minutes, including mounting and unmounting of the panels in the tester.

Professor Bright's automatic enterprise is close at hand. He says: "We have the imagination, the intellect, the capital, and the markets. Now we need determination and action by management to regain undisputed leadership of the world."

Indirect Labor: Idle Army

"Thou shalt concentrate thy efforts where the rewards are greatest."

Anyone adhering to that commandment is forced to seek ways to trim indirect labor costs. Some estimates put metalworking's waste in that area at better than $7 billion yearly—more than the industry spends on equipment in its best years. For tips on paring indirect labor costs, see STEEL, Apr. 10, p. 53-56.

Mountains of Meaninglessness

The creation, movement, filing, storing (and shuffling) of paper is enough of a plague when the work is necessary. And mountains of meaninglessness are continually added to the paper that is useful.

A new survey by the National Office Management Association finds that 1 in 10 U. S. firms have no record control program of any kind. And only 2 in 5 have any formal system. Only 1 in 5 firms had recently conducted a complete record analysis; 1 in 3 had done a partial analysis; about half had not made any analysis.

Of 1200 firms surveyed, only 250 considered more than 60 per cent of their records to be vital; 860 firms said less than half their records were vital (212 companies said less than 10 per cent).

Of 900 firms surveyed by NOMA that had made some study of their paperwork, 59 eliminated more than half of it. More than half the companies eliminated more than 20 per cent of their records.

It Can Be Done

"Thou shalt challenge tradition and hold no method to be sacred."

Some grinding experts are doing that. They say the grinding wheel should be considered an "abrasive machining" tool and that it can be used on jobs where you're removing even as much as ¼ in. of metal. Mattison Machine Works, Rockford, Ill., ran cost comparisons for several parts. The grinder completed 81 forged steel chain links an hour at 14 cents each. A milling machine completed 16 an hour at 80 cents each.

Challenging tradition is a good application for value analysis (VA). Even after good design and manufacturing cost reduction work, 15 to 25 per cent of shop costs can usually be removed through VA, says General Electric. It challenges VA trainees to take 25 to 50 per cent out of the cost. The firm isn't kidding. It cropped $3 million out of the cost of armament and flight control equipment for the F-105 fighter-bomber through VA, and it trimmed $767,000 from the cost of a tracker serving as part of the guidance equipment for the Atlas missile.

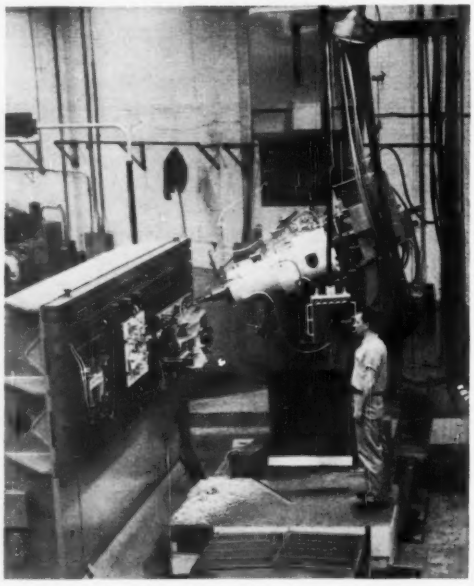
The VA philosophy, advanced by GE more than ten years ago, teaches employees to use a businessman's judgment. It relates cost to the function, service, or operation purchased or performed by that cost. The analyst asks: What is this? What does it cost? What does it do? What else would do the job? What would it cost? The analyst is taught to seriously question any cost that does not buy function (doesn't make the product work better or sell better). It's not committee work. One man intensely follows a project, calling on occasional aid from others.

Asserts Dr. C. C. Van Vechten of Thompson Ramo Wooldridge Inc.: "Value analysis represents a synthesis of elements permitting a function oriented attack on cost that promises a 35 to 65 per cent reduction contrasted to the 15 per cent that can be hoped for from traditional, methods oriented, cost reduction techniques."

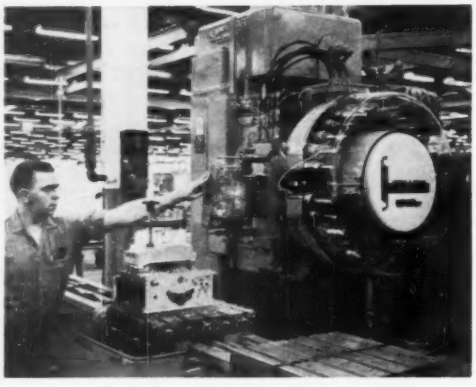
Get Suppliers to Help

The value analysis philosophy can be applied to purchased items as well as those made in your own

Machines like these . . .



Giddings & Lewis Variax at Republic Aviation



Kearney & Trecker Milwaukee-Matic at Tapco

SAVED this . . .

Fuselage former

73%

OLD METHOD: 8.06 hours

NEW METHOD: 2.16 hours

Wing spar cap

71%

OLD METHOD: 50 hours

NEW METHOD: 14.4 hours

Outboard wing skins

93%

OLD METHOD: 30 hours

NEW METHOD: 2.2 hours

shop. It can be an effective way to make use of your suppliers' brainpower. Two cases from Western Electric Co. illustrate the payoff potential:

- **Saved: 30 Per Cent**—More than 100 firms supply parts and materials for Bell phone booths. Purchasing canvassed suppliers for design improvements, got 90 suggestions that were approved. The quality of the booth was boosted, and the cost was slashed 30 per cent.
- **Saved: 95 Per Cent**—A buyer questioned the standard method of producing miniature coils from nylon rod in an automatic screw machine and recalled a firm that had developed a special injection molding process. The molder took the job; cut the cost by 95 per cent; saved Western Electric $26,000 a year.

Standardize to Save

"Thou shalt standardize wherever practical."

Metalworking could probably save $1.5 billion annually through standardization. That's based on a survey by the American Standards Association which found that the average program achieves savings equal to about 1 per cent of sales. Savings

on these complex parts for . . .

Photos: Republic Aviation Corp.

Tapco and Republic Aviation

SINCE 80 PER CENT of all machined items produced in the U. S. are made in lots of less than 20, numerically controlled machine tools offer significant benefits to almost all metalworking plants. They can dramatically slash production costs, while improving quality and permitting faster delivery.

That has been the experience of Republic Aviation Corp., Farmingdale, N. Y., and Thompson Ramo Wooldridge Inc.'s Tapco Group, Cleveland. For example, take Tapco's results on aircraft hydraulic manifolds:

The manifolds have a maze of holes, some of them intersecting to allow the change of direction of the fluid. There are milled surfaces, tapped holes, plain holes, milled recesses, and counterbores.

With conventional equipment, it took 460 hours of machining to complete the part. Now, on the Milwaukee-Matic, it takes 250 hours. Setup time was cut from 41 hours to 1½ hours. Tape also eliminates human error and reduces scrap. Work formerly done on five machines is now done on one, bringing savings in handling costs. And a shuttle transfer makes it possible to run two different jobs at the same time.

"Savings brought by the equipment have been passed on to the customer," says J. R. Crobaugh, operations manager.

Republic Aviation estimates that duplicate tooling costs can be cut to 1 per cent of the conventional expenses by using tape. It says machining time is usually reduced by 65 to 85 per cent. And tool storage space is trimmed around 80 per cent. The three examples of savings in machining time illustrated at left, were on Republic's F-105 program.

Here are other examples of savings through numerical control at Tapco:

- On a missile job, 72 hours of conventional machining have been replaced by 6 hours with tape.
- A missile gear case did take 16 hours to machine —now takes 2½ hours.
- A sculptured part (machined from the solid) took 24 hours in the toolroom, now takes 3 hours.
- On a rocket nozzle, machining time was slashed from 10 hours to 2 hours.

range up to $50 per $1 spent on standards work. On the average, $6 is saved per dollar invested, says ASA. Examples:

- Pope Machinery Corp., Haverhill, Mass., saves $10 for each $1 invested in standardization.
- Norton Co., Worcester, Mass., saved $3700 per year by standardizing on ball bearings alone.
- Eastman Kodak Co. spends well over $100,000 a year on its standards program and figures it saves "5 to 10 times the amount we put into it."
- Users of abrasive belts will soon be reaping the benefits of a standards program sponsored by the Coated Abrasives Manufacturers Institute. No fewer than 104 different belt lengths are being produced. CAMI has proposed that only 31 lengths be made and has asked machinery makers to design equipment to accept the standardized units. The machinery firms have almost unanimously agreed.

Preventive Maintenance

The mounting complexity of machinery is exerting strong upward pressure on the costs of corrective maintenance. Fixing equipment before it breaks

Three Ways to Cut Materials Costs

1. Organize Materials Function

"Good teamwork permits purchasing people to buy economically for engineering, manufacturing. To improve teamwork: Spell out responsibilities, authority; develop communications; motivate people . . ."

DAVID S. GIBSON
Vice President-Purchases
Worthington Corp.

2. Raise Buying Standards

"The buyer wants the best price he can get, of course, but he wants to get it by fair means. Ethical buying pays in better vender relations which can lead to many mutually beneficial cost savings."

GLENN N. HACKETT
Director of Purchasing
Thompson Ramo Wooldridge Inc.

down eases the cost burden. Says a Western Electric maintenance executive: "If the same degree of management attention and modern methods are applied to maintenance cost reduction as have been applied in the production area, most firms could cut such costs by 20 to 25 per cent." Metalworking employs 1 maintenance man per 5 or 6 production workers, a study by International Maintenance Institute shows.

Opportunity in Materials

Materials open up many avenues to cost reduction because:

1. They account for more than half your costs (when defined as anything you buy or make, including components, to go into finished products).
2. Technological changes that are occurring give broad scope for better design, improved reliability, substitution, and many other techniques for cutting costs.

How can the potential be achieved in materials efficiency? Three related approaches are needed, believe the experts:

1. Better organization of the materials function.
2. Higher buying standards.
3. More skillful purchasing.

• **Better Organization** — Many believe materials management is the answer to better organization. It's the most provocative concept to hit purchasing since value analysis.

The approach is being studied by a committee of the National Association of Purchasing Agents. It's defined by the chairman of the committee, Andrew M. Kennedy Jr., vice president for purchasing and traffic, Westinghouse Electric Corp.:

"Materials management represents one complete, undivided responsibility for providing the materials a company needs . . . in the right quantity and quality—at the minimum cost—which cost should include transportation, inspection, storage, and delivery to point of use."

The last clause makes materials management distinct from straight procurement. Some definitions go even farther, extending the control of materials into, through, and out of the plant.

Materials management makes great demands on the manager in charge. The larger the company, the harder it is to co-ordinate the whole job through one man. Sometimes, it can be divided among several executives and the co-ordination achieved by committee.

Teamwork is essential in materials management. Lack of it usually comes when: Co-ordination is poor at the top; communications are bad; and key personnel don't understand the whole setup.

The commandments of teamwork:

1. Pay all players adequately.
2. Convince each player he can upgrade himself.
3. Provide good two-way communications.
4. Teach the interrelationship of each job.
5. Sell each new procedure before it's adopted.
6. Bring in at the start the man involved in any new play.
7. Know the capabilities of all players.
8. Give full credit for every contribution.

• **Higher Standards**—The correct organization of the materials function is a long step toward achieving higher buying standards.

Purchasing has come far in a short time. Procurement problems of World War II gave the PA new stature in the business community. Although he's now on the verge of professionalism, or in some cases has reached that status, he's still criticized.

Several made this charge to STEEL: Some buyers, particularly in government work, give away pro-

3. Buy More Skillfully

"The major way to stop price fighting is: Cut costs to make legitimate price reductions. Through value analysis and other improved purchasing practices, our company saved more than $100,000 in 1960."

W. E. GOMBERT
Purchasing Agent
Addressograph-Multigraph Corp.

prietary secrets, leak advance information about supposedly secret bids, demand excessive information about our costs and manufacturing methods, create an unfair atmosphere of crisis and haste in the hope that we'll make bidding errors in their favor.

Top management must set the right moral tone for its purchasing people. Worthington Corp.'s Mr. Gibson says management can insure higher ethics by: 1. Accepting purchasing as part of the management team on a par with marketing, engineering, and manufacturing. 2. Being more selective in hiring people for purchasing. 3. Establishing an educational program that offers at least a partial tuition refund. 4. Supporting and participating in purchasing education in schools and associations.

• **More Skill**—Professional status also comes when the purchaser is more skilled at his job. Like any pro, the buyer can still learn in many areas, but the experts advise concentration in eight:

1. Make materials work harder. The president of a company making television sets asked his buyers to suggest the cheapest cabinet. Their answer: A paper bag. The result: A molded paper cabinet impregnated with plastic which has been successfully marketed.

2. Look at what new materials can do. Armco Steel Corp. introduced a precipitation hardening stainless steel, 17-4 PH, in the early 1950s as a Space Age material for critical aircraft and missile components. But its ease of fabrication has won it a place in more conventional applications. In a high pressure, hydraulic, quick connect coupling, Snap-Tite Inc., Union City, Pa., used it instead of SAE 4140 alloy, with a subsequent 52 per cent saving in cost per part.

3. Pick the right material. By using galvanized steel sheets instead of painted sheet metal in two major components of its gas home furnace line, Fraser-Johnson Co., San Francisco, has reduced production cost on those parts by 30 per cent.

4. Standardize. Savings range up to $50 for $1 spent on standards work. On the average, $6 is saved for every $1 invested in standards activities. (See Page 86 for more details.)

5. Get higher reliability. To put an Atlas missile on target 9 times out of 10, each of the missile's 300,000 components must have a reliability of 99.99996 per cent. That points up the fantastic demand being placed on metalworking by the Space Age—and not just on the missilemaker. All customers want products that will perform better longer, so their service costs will drop. And they want such quality with little, if any, change in price.

6. Slash scrap costs. Higher reliability is a principal way to cut the percentage of scrap generated. Three others: Convert as much of your scrap as possible for other uses; upgrade the quality of the scrap that can't be converted to get the best price for it; improve in-plant handling.

7. Use your suppliers' brainpower. Only three people report to the average purchasing agent, so he needs help. He can get it from his suppliers. Example: A Western Electric Co. buyer was talking with a North Carolina supplier. The supplier mentioned his ability to clad precious metals to base metal stock. The buyer recognized that the process might work in gold plating electrical contact rings. It did. Wear was reduced, the reject rate cut, and Western Electric saved $96,000 annually. (See Page 85 for more details.)

8. Get more for less. This involves legitimate price negotiation, the hunt for lower-cost suppliers, and aid to venders in cutting their own expenses. Minneapolis-Honeywell Regulator Co.'s quality rating system for venders can help in all three approaches. Each vender gets a monthly or quarterly rating. If it's low, a Honeywell committee determines why, then initiates corrective action. If the supplier doesn't improve, he's out.

The Best Answer

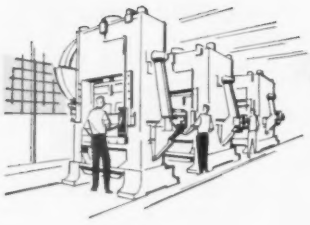
The most effective way to stop price fighting is to cut your own costs to make economic price reductions. That's the consensus of panel members from Cleveland, Chicago, New York, and Pittsburgh who discussed the problem with STEEL editors.

Myriads of methods are available for cutting costs, but three that promise the best results are the three M's—use of better machines, methods, and materials.

The three M's and other methods allowed the auto industry to cut prices in half during the 1930s (see the following section, Page 91).

The same formula has helped Lincoln Electric Co. cut welding equipment prices to the extent that today they are lower than they were 25 years ago, even though the cost of labor and materials now is more than three times the level of 1936.

• Bound reprints of the study on Price Fighting are available at $2 a single copy; prices for larger quantities on request. Write Reprint Dept., STEEL, Penton Bldg., Cleveland 13, Ohio.



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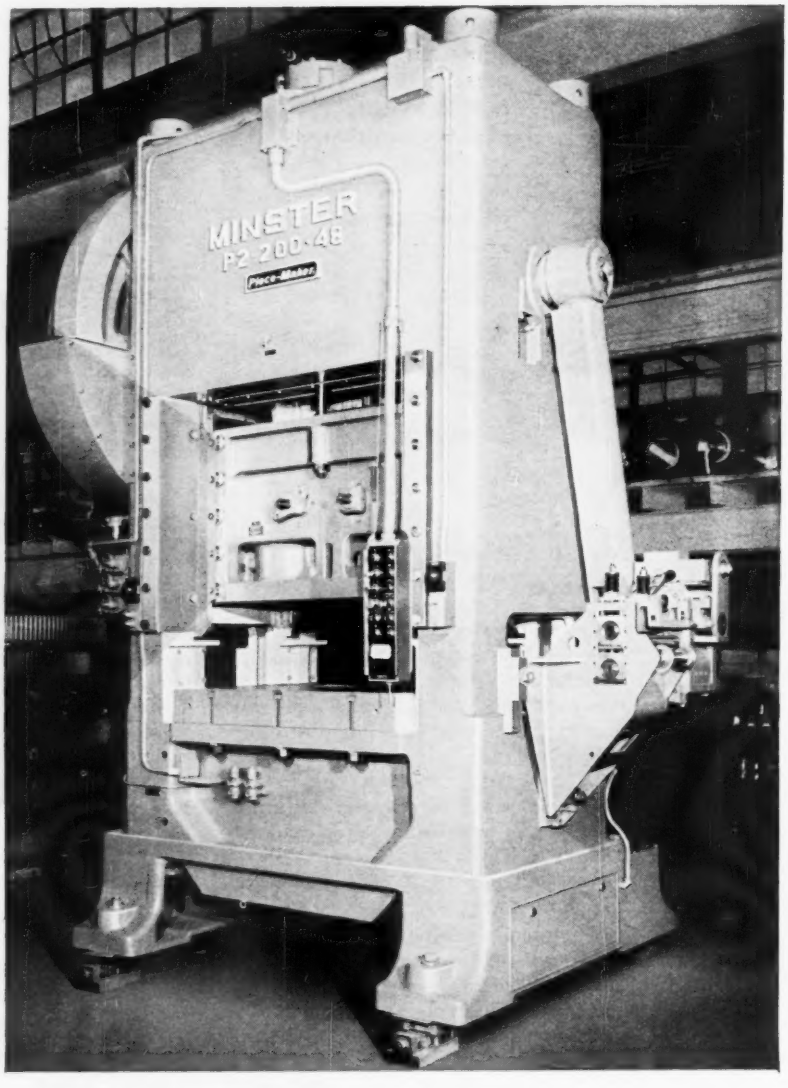


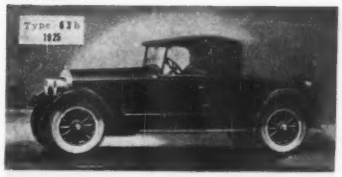
LAMINA-BRONZE WEAR PLATES

Lamina
DIES AND TOOLS, INC.
P.O. BOX 31, ROYAL OAK, MICHIGAN
Phone JOrdan 6-8711

Lamina-Bronze Wear Plates and their use are more completely described in Bulletin WP-59, send for your free copy.

The adjustable slide ways of this Minster press utilize Lamina-Bronze (electroplated bronze on steel) Wear Plates to assure long-life and free-running. In like manner, Lamina-Bronze wear surfaces are the best answer for any part that requires the non-seizing properties of bronze and the strength of steel.

Cadillac Specifications

	1925	1936
		
	Roadster, Model 63	2 Passenger Coupe, Series 36-60
PRICE	$3185	$1645
Weight	4190 lb	3830 lb
Wheelbase	132 in.	121 in.
Over-all Length	194 ¾ in.	195 15/16 in.
Type Engine	90 deg. V-8	90 deg. V-8
Horsepower	83	125
Compression Ratio	4.70 x 1	6.25 x 1

How Detroit Cut Prices in 1930s

Can prices be cut in half through cost reductions? The auto industry did it in the 1930s, to help lead the U. S. out of the Great Depression —through economic price cutting. Harold G. Warner, General Motors Corp. vice president and Cadillac Div. general manager, tells us how Cadillac did it and reminds us that yesterday's lessons can be applied today

"I SIGNED on at Cadillac in 1927 (as an assembly line worker) for 45 cents an hour, plus bonus," recalls Harold G. Warner, now general manager and GM vice president.

Automobiles were becoming dependable products in that decade following World War I, but prices were high (76 cents a pound for a 1925 Cadillac). Nevertheless, a record 3.7 million cars were sold in '25.

• **Good Roads Doubled**—The country had half a million miles of surfaced roads by 1925, twice as many as before the war. Vehicle owners drove 122 million miles that year. One business in 12 and 1 person in 20 were directly involved in highway transportation for income.

Cars were expensive, but they were being improved steadily. Cadillac introduced thermostatic carburetor control, balanced crankshafts, and crankcase ventilation to the industry during the mid-1920s. Other automakers were making similar progress.

• **Equipment Better**—But something else was happening in that decade. To meet the demands for more dependable cars, automakers were developing modern equipment and manufacturing methods that would turn out better parts faster.

Says Mr. Warner: "In my opinion, one of the biggest advances in the 1920s was the shift from lineshaft drives to individual, motor driven machinery. We could buy electric motors in useful sizes, which permitted more flexibility in feeds and speeds. We devised multipurpose machines that could do several operations at a single loading."

The advances in equipment and methods simplified design changes because machines could be set up more quickly and moved to other locations to meet manufacturing requirements for new models. With better equipment, engineers started to try out

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Cadillac Develops Early Precision Machine

FRANK M. PRUCHA
Cadillac's general master mechanic

BORING wrist pin bushing holes on engine connecting rods is a simple job today. Automakers routinely turn out millions every year. But back in the 1920s, machining the 2.5 lb rods was a time consuming, complicated reaming job. A foreman was lucky if he could turn out 3000 or 4000 parts before his tools needed resizing. Even simple temperature changes affected tolerances. "We used to lay those rods out in the sunshine, so they'd stay warm until the inspector had checked them," recalls Frank M. Prucha, Cadillac's general master mechanic, who was then a young tool engineer.

To meet the ever growing demands for tighter tolerances, higher production runs, and lower costs, Cadillac decided to build a machine that would bore the holes in the bronze bushings more precisely than any equipment then available. Development began in 1923. The first big production job—the connecting rod for Cadillac's big 16 cylinder engine—was started in 1929. "We bored over 100,000 holes without resizing," says Mr. Prucha. "Nobody knew how we were doing it, and we sure didn't let them in to find out," he remembers. Cadillac was using diamond cutting tools, the first application of its kind in industry. Listen to Mr. Prucha tell the story:

"We built that first borer up on the bed of an old Heald grinder. We ran it with flat belts to an overhead driveshaft. It was really a two way machine with different sized belts on each end because we were boring two different holes and at different speeds.

"There weren't any industrial diamonds in those days, so we bought real jeweler's diamonds. We put a blunt nose on them, so the feed lines wouldn't show. We mounted them in bismuth because it was the only metal we could melt that would expand when it cooled. Nobody knew for years how we held the bits in place.

"Our tool feed on the bushing hole was 0.0007 in. per revolution at speed of about 3500 fpm. We couldn't go faster or the spindles would freeze up.

"Holding the rods was a headache. We tried everything, even C-clamps. Finally, we came up with what now is called a floating clamp. We locked one clamp on the rod, then clamped the clamp."

Eventually, Cadillac turned its design information over to machine tool builders, and they started making precision borers for the rest of the industry. ("We were in the automobile business, not machine tools," says Mr. Prucha.)

design ideas that weren't feasible up to then.

• **Depression Strikes**—The new ideas and techniques were soon needed. In 1929, factory sales reached a record 4.4 million units. Cadillac hit its second best production year up to that time—40,965 cars, including the La Salle. Cadillac offered 25 models. The lowest price V-8 coupe cost $3295. The division was readying V-12 and V-16 engines.

Then came the depression. Automobile sales dropped to 2.7 million in 1930 and sank to a low of 1.1 million in 1932. By 1936, only 30 carmakers remained in business.

The Cadillac Div. built only 6655 units in 1933. But the year before a new manager, Nicholas Dreystadt, took over. "He wasn't interested in doing things the old way. He wanted to do what was best," Mr. Warner recalls.

• **New Methods Wanted**—He called for a new car that would be considerably lower in price, much better in quality and performance. Materials, methods, and machines developed in the 1920s came into full play.

Four years passed before Cadillac introduced (in 1936) its streamlined, 125 hp, V-8 that sold for $1645. It cost 35 cents a pound less than the car of a decade before. The engine was cast "in block" instead of having two cylinder blocks bolted to an aluminum crankcase. It has precision bearing shells instead of babbitted bearings. Other features included an all steel body (the Turret Top), air cooled generator, hydraulic silencers, and No-Draft ventilation. Production of Cadillacs leaped from 3628 in 1935 to 12,901 in 1936.

The 1936 Cadillac was a better car that cost less because it was produced more efficiently. At the beginning of 1925, 7012 employees were on the division's payroll. Production that year was 16,673 cars. In 1936, Cadillac turned out 25,950 (including La Salle), but only 3755 persons were employed at the start of the year.

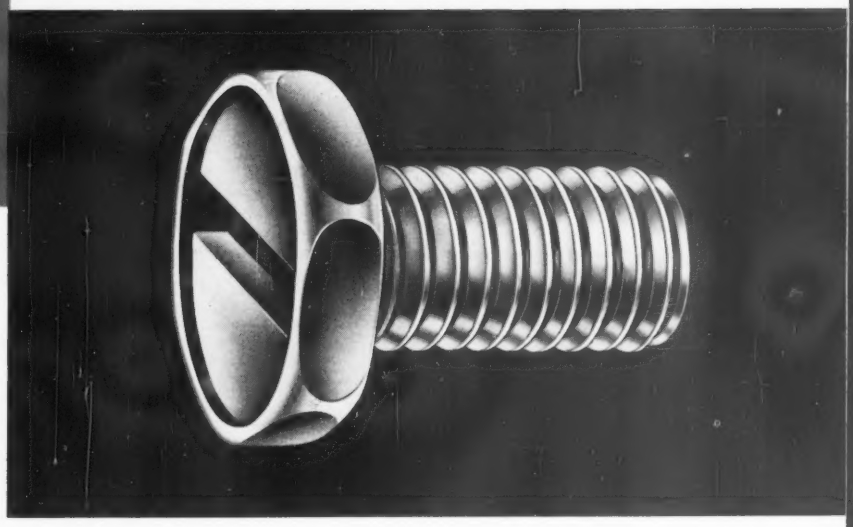
As the auto industry recovered, it provided more jobs for a depression weary country. By 1936, the nation had more than 1 million miles of surfaced roads. Vehicle owners traveled 252 million miles. About 1 person in 10 was earning a living from the automobile business. The price of the average car had dropped to 21 cents per pound. Industry sales again hit 3.7 million units.

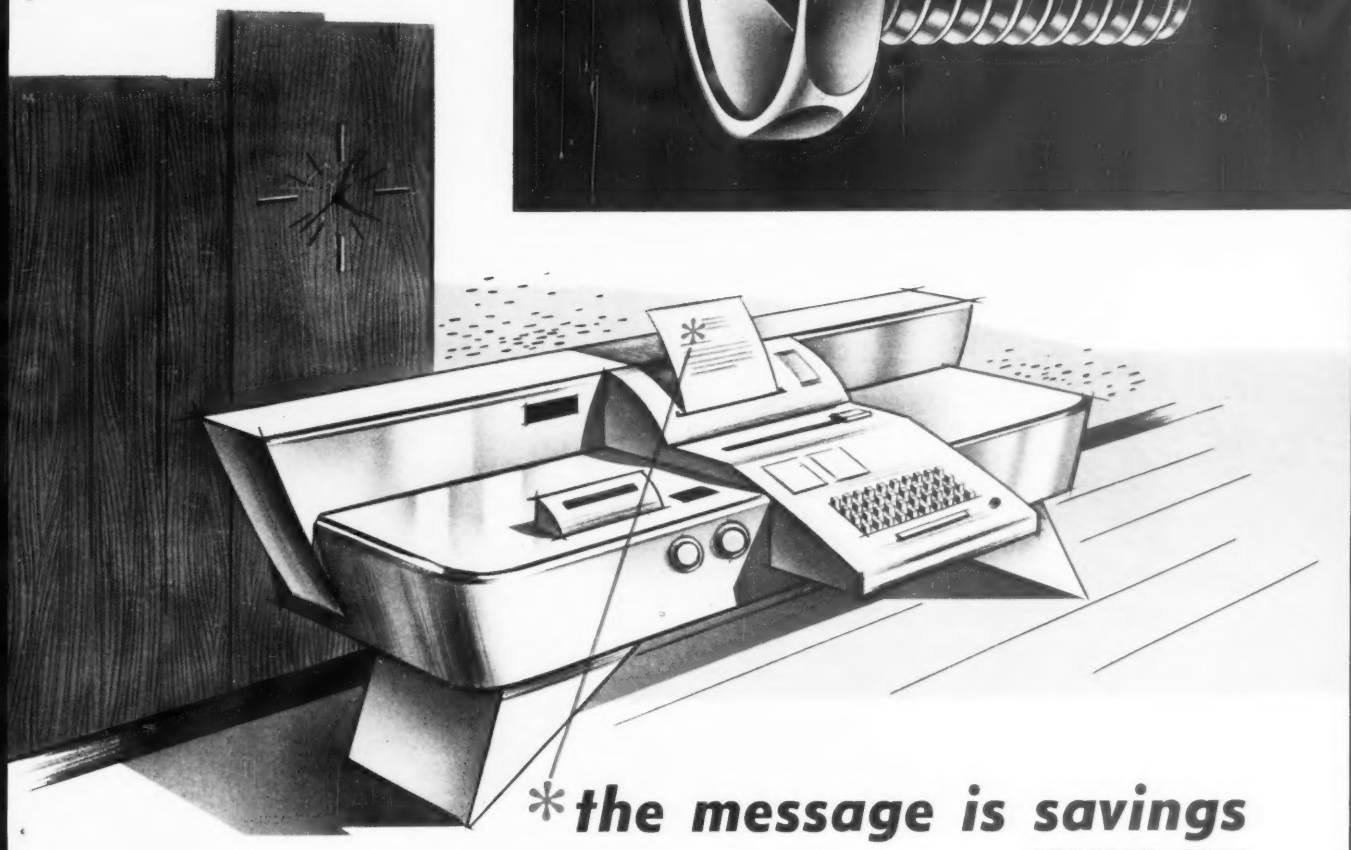
• **New Route**—"We were on our way again but on a different road," says Mr. Warner. Besides new and improved materials, methods, and machines, which largely had their beginning in the 1920s, modern management techniques were burgeoning.

• **Lesson Still Valid**—Inflation has caught up with car prices. The 1961 Cadillac costs $1.07 per pound —but the figure hasn't changed in the last four years.

Says Mr. Warner: "The same type of approach we used back in the late 1920s and early 1930s is applicable today in cutting costs, but I believe the rate of progress today can be be even greater."

approved by the electronics INDUSTRY





*the message is savings

Put *your* products in this picture . . . what we have done for others we can do for you. Only a few years ago the part pictured in the illustration was made on a screw machine because no one had ever successfully manufactured it by cold heading. The customer was paying a premium for this part and sacrificing strength in the process. GLS engineers reviewed the job and perfected the part to run quickly and perfectly on cold heading equipment. This customer benefited many ways. First, he was able to reduce his capital investment in screw machines. Second, he was able to release many dollars of raw material inventory. Next, the strength was increased due to cold forming. None of the original material was machined away as scrap. Therefore, he is buying the stronger cold headed part for less. Message? *The Message is savings.*

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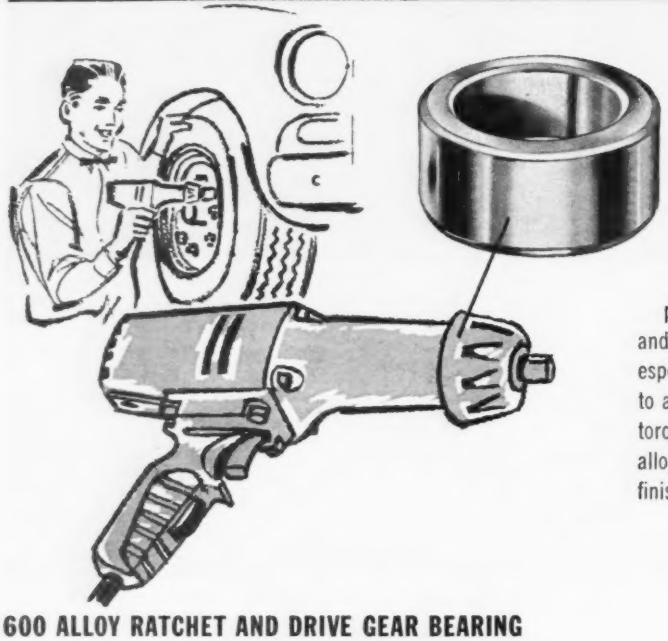

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This heavy-duty impact wrench takes the rigorous punishment of hard industrial use right on the nose . . . and right on the 600 Series nose bearing. This bearing was especially chosen by the manufacturer because of its ability to absorb a range of 1600 to 1800 impacts per minute at a torque of from 0 to 250 foot pounds. By specifying 600 bearing alloy, the manufacturer gets superior performance from his finished product.

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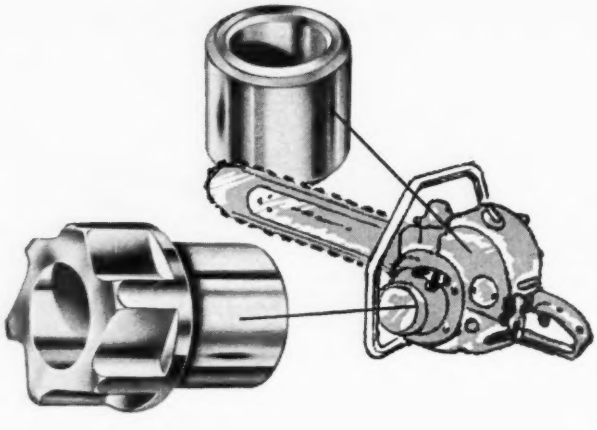

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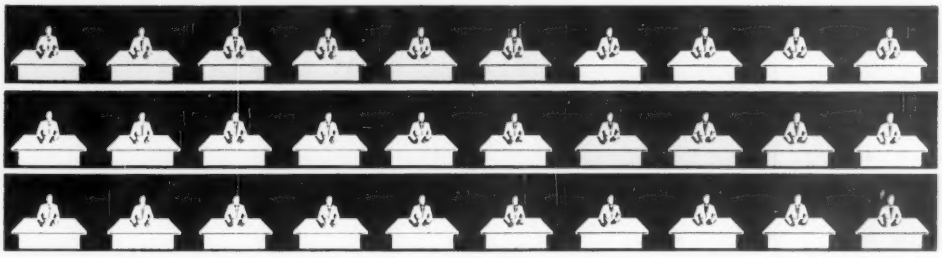
The editors asked STEEL's Panel of Economic Consultants:

HOW MUCH OF A PROBLEM IS PRICE FIGHTING?



6 of 10 said **SERIOUS**

3 of 10 said **MILD**

1 of 10 said **NOT SERIOUS**

Economists Study Price Fighting

"INDISCRIMINATE cutting of prices without regard to cost or demand for the product results in a waste of resources," declares a member of STEEL's Panel of Economic Consultants.

"However, strong price competition is still the best mechanism yet derived to insure proper allocation of those resources to obtain the best products at the lowest prices."

The display above indicates that a majority of the economists responding to a special STEEL survey agree that price fighting is a serious problem.

• **Other Side**—But the minority contends: While rampant price fighting is harmful to companies or industries, it can be an asset to the over-all economy. As Ingersoll D. Bruner, economics research analyst for Carrier Corp., Syracuse, N. Y., puts it: "In time, this situation is bound . . . to eliminate the marginal operations."

A bank economist recognizes the seriousness of the problem but declares that "a free pricing system with strong competition—with respect to price, quality, service, etc.—is best for the economy as a whole. Any attempt to limit price fighting would put restrictions on individual freedom to set prices."

• **Hands Off**—Panel members, speaking as professional economists rather than spokesmen for their companies, reveal that they tend to view this problem with a great deal less emotion than their contemporaries in administration, production, sales, or purchasing. For instance, many feel that businessmen have no cut and dried solution to the problem. Nearly half say the only solution is to let it run its course, mainly because the conditions that have fostered severe and indiscriminate price cutting—excess capacity and soft markets—will in time be corrected and alleviate the situation.

And they don't feel there is much the government can do to prevent price fighting. George Coleman, economist for Mercantile Trust Co., St. Louis, expresses the view of practically all the respondents: "Government price control is to be avoided at all costs except in time of war. It would bring on conditions worse than those resulting from price fighting. Competition is the essence of a free market. In a highly complex and competitive society such as ours, competition takes place not only in terms of prices but of quality and service as well."

• **Intelligent Selling**—In fact, over half the economists feel that if there is any solution to the problem, it is to emphasize sales factors other than price—quality, service, delivery, performance, reliability. William D. James, product manager, Bausch & Lomb Inc., believes that the solution hinges on "basic education of producers' personnel responsible for price decisions on the interrelationship of real cost, volume, and profits. What is needed is a return to fundamentals of sound decision making."

Edward L. Cushman, vice president of American Motors Corp., offers this approach to a solution: Divide excess concentration of power in industry or labor through modernization of antitrust laws and

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STEEL
The Metalworking Weekly

Members of STEEL's Panel of Economic Consultants Speak Out on PRICE FIGHTING

"Price fighting has acted as a downward pressure on costs, wages, and capital expenditures. It affected 1960 profits (between 5 and 10 per cent) since competition for level or declining markets became much more severe in the past year."

WILLIAM D. JAMES, Product Manager
Bausch & Lomb Inc.

other statutes, thus increasing effective competition.

• **Hard to Measure**—The economists agree that the effect of price fighting in dollars and cents is hard to measure. However, most of those who express an opinion believe that profits take it on the chin when price fighting gets rough. Mr. James of Bausch & Lomb puts the loss at 5 to 10 per cent in 1960, although he doubts that the effects over the last five years are traceable. One says steel corporate profits may suffer as much as 20 per cent annually.

Stanley V. Malcuit, staff economist for Aluminum Co. of America, analyzes the situation this way: "During a contraction, price becomes increasingly important as a selling factor. In the last five years, we have experienced two business contractions, so it seems reasonable to assume that price fighting has had a greater impact on corporate profits during this period than during the 1946-50 or 1951-55 periods, each of which experienced only one contraction.

"Today, of course, large capacity exists to produce and fabricate most

"Price fighting can be beneficial by weeding out inefficient firms which can only serve as a drag on the economy. On the other hand, it can become an economic liability in an industry where members either ignore or have imperfect knowledge of both their costs and the nature of the demand for their product."

STANLEY V. MALCUIT, Staff Economist
Aluminum Co. of America

"I was brought up on the supposition that vigorous price competition is an essential ingredient of a free, private enterprise system. We may not always be able to achieve it, but the determination of prices in a free market should remain our objective."

MURRAY L. WEIDENBAUM, Corporate Economist
Boeing Airplane Co.

metals; pent-up demand for durable goods is relatively well satisfied; and foreign competition is becoming increasingly severe—all of which magnifies the danger and harm of destructive price fighting."

But profit is not the only aspect of metalworking that suffers from willy-nilly price cutting. "It has a negative impact on product and market development, on cost cutting through investment in better equipment, and ultimately on the value per dollar which an industry can give its customers," declares one panel member. "The temporary 'bargains' created by price fighting are costly to *all* segments of the economy, including the consumers."

• **Hardest Hit** — Even though the members of the panel as a whole fail to show great alarm about the problem of price fighting as applied to the national economy, they are not quite so academic when it comes to specific industries. When asked to pinpoint areas of most severe price fighting, they tend to point at their own segment of metalworking. The nonferrous industry received a large share of votes.

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Price Fighting: What's the Law?

Paul Rand Dixon
Chairman, Federal Trade Commission

Robert F. Kennedy
Attorney General

"PRICE FIGHTING can be as bad as price fixing," says a Federal Trade Commission attorney questioned by STEEL.

There's no federal statute that prohibits the practice, but you can get into trouble with several U. S. laws if you cut prices for the wrong reasons. The Federal Trade Commission Act forbids unfair methods of competition. The Sherman Act prohibits price fixing and price cutting to create a monopoly, or drive a competitor out of business. The Clayton and Robinson-Patman Acts make discriminatory price policies unlawful.

● **WHERE TROUBLE COMES** — Almost any wholesale cutting of prices below cost could cause a manufacturer to run afoul of one or more of those laws.

A proved pattern of price cutting might be seen by the Justice Department and the FTC as an attempt to monopolize an industry in violation of the Sherman Act.

Where two national firms dominate a market, price cutting could be unlawful if there is intent to put one of the firms out of business—a violation of the FTC Act.

Where one firm is cutting prices in only a part of its market to rid itself of a troublesome local competitor, a violation of the Clayton or Robinson-Patman Acts could be involved.

● **TOUGHER JUSTICE, FTC ATTITUDES**—The new administration has pledged to keep a close watch on industry. Attorney General Robert Kennedy has asked FTC Chairman Paul Rand Dixon to find out if defendants in any of 56 antitrust cases tried since 1940 aren't living up to judgments against them. Mr. Dixon hailed the request as "the inauguration of a new era of co-operation" between Justice and FTC. (He asked for 200 investigators to carry out the job.)

Reportedly, Mr. Dixon is also interested in broadening Section 5 of the FTC Act (which relates to unfair competition) and in bringing a test case to court on the administered price theory long advocated by his old chief, Sen. Estes Kefauver (D., Tenn.).

● **DO WE NEED MORE LAWS?**—The question of a law against selling below cost has been brought up often by lawyers in discussions of the relation between prices and monopoly. A law against loss leaders has been suggested by small business groups to protect little retailers competing with large chains.

A law like that on the industrial level would be hard to enforce, even if a Congressional majority thought it desirable. Nevertheless, some high federal officials favor such a measure, but they're in the minority.

Several bills in the Congressional hopper would restore fair trade to federal jurisdiction, but opposition is strong. The McGuire Act permits state fair trade laws.

● **PROTECT THE CONSUMER**—In the general area of prices, the Kennedy administration will probably give the most attention to a "Protect the Consumer" campaign. A special bureau for consumers is planned. Antitrust actions will be picked on the basis of those which affect the most consumers.

Consensus of administration and Capitol Hill sources on what lies ahead for industry: The freedom of entry into a business field will become more important as a gage of competitiveness, so price fighting will be watched more closely for indications of unfair competition than it has been in the past. Technological advances which should lead to consumer benefits will be followed to see how industry uses them. Business theories advocating the benefits of "orderly markets" will automatically be grounds for suspicion.

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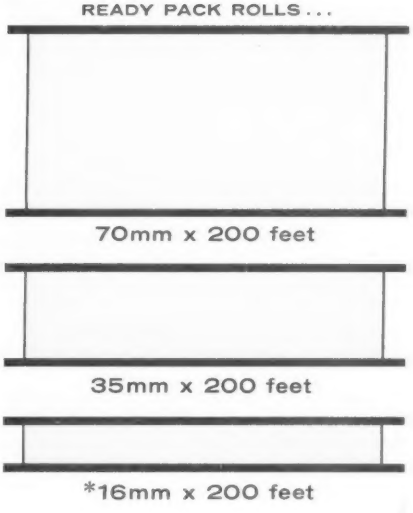

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New Specifications Permit Use of Basic Oxygen Steel

Type		Applications
PIPE		
API	5L	Line pipe.
	5LX	High test line pipe.
	5A (tentative)	Casing, tubing, and drill pipe.
	5AX (tentative)	High strength casing and tubing.
ASTM	A53-60T	Welded and seamless steel pipe.
	A120-57T	Black and hot dipped galvanized, welded, and seamless steel pipe for ordinary uses.
	A135-60T	Electric resistance welded steel pipe.
	A252-59	Welded and seamless steel pipe piles.
TUBING		
ASTM	A83-60T	Seamless steel boiler tubing.
	A178-60T	Electric resistance welded steel and open hearth iron boiler tubing.
	A214-60T	Electric resistance welded steel heat exchanger and condenser tubing.
STRUCTURALS & RIVETS		
ASTM	A7-58T	Steel for bridges and buildings.
	A36-60T	Structurals.
	A113-58	Structurals for locomotives and rail cars.
	A131-59	Structurals for ships.
	A141-58	Structural rivets.
	A283-58	Low and intermediate tensile strength carbon steel plates—structural quality (2 in. maximum thickness).
	A373-58T	Structurals for welding.
	A441-60T	High strength, low alloy, structural manganese-vanadium steel.
SHEETS & STRIP		
ASTM	A109-59T	Cold rolled, carbon steel strip.
	A245-58T	Flat rolled, carbon steel sheets—structural quality.
	A303-58T	Hot rolled, carbon steel strip—structural quality.
	A365-58T	Cold rolled, carbon steel sheets, special killed for miscellaneous drawn or severely formed parts.
	A366-58T	Cold rolled, carbon steel sheets, commercial quality.
	A374-58T	High strength, low alloy, cold rolled steel sheets and strip.
	A375-58T	High strength, low alloy, hot rolled steel sheets and strip.
	A414-58T	Carbon steel sheets—flange and firebox qualities.
	A415-58T	Hot rolled, carbon steel sheets—commercial quality.
	A424-58T	Steel sheets for porcelain enameling.
	A425-58T	Hot rolled, carbon steel strip—commercial quality.
BARS		
ASTM	A29-60T	Hot rolled and cold finished carbon and alloy steel bars (general requirements).
	A107-59T	Hot rolled, carbon steel bars.
	A108-58T	Cold finished, carbon steel bars and shafting.
CONCRETE REINFORCEMENT		
ASTM	A15-58T	Billet steel bars.
	A82-58T	Cold drawn steel wire.
	A408-58T	Special, large size, deformed, billet steel bars.
	A431-59T	High strength, billet steel bars.
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• LOOK FOR fabricators to put basic oxygen steel to work in an ever widening range of applications. Use of the steels—as made by the L-D process—is permitted in a total of 38 specifications listed by the American Petroleum Institute (API) and the American Society for Testing Materials (ASTM).

That's the word from no less an authority than J. K. Stone, manager, Steel Plants Development Dept., Kaiser Engineers Div., Oakland, Calif., Henry J. Kaiser Co.

The first ASTM specification that permitted use of the basic oxygen product (A120-57T) was written late in 1957.

• Application of carbon and low alloy steels made by the L-D process will probably increase in the pipe, tubing, and structural areas, thanks to specification changes made in the last year.

Several grades of carbon steels made by the L-D process are now permissible in pipe and seamless or electric resistance, welded tubing, and many structural applications.

One of the newer specifications (ASTM A441-60T) covers high strength, low alloy, structural steel shapes, plates, and bars, intended primarily for use in welded bridges and buildings where weight savings or added durability are desired. In sections up to 4 in. thick, the steel can be used for riveted and bolted construction. Its resistance to atmospheric corrosion is said to be twice that of the carbon structural steels.

• Fabricators are expected to use more sheets and strip made from the basic oxygen ingots for bending, forming, drawing, and special processing—such as porcelain enameling.

Deep drawing sheets of cold rolled, carbon steel (ASTM A365-58T) can now be made from basic oxygen steel. Marketed in coils or cut lengths, they are produced primarily for drawn or severely formed parts where a good surface finish is required. The material is desirable when long storage might cause aging (loss of drawing properties), or where roller leveling facilities aren't available to prevent stretcher strains.

Sheets and coils in several other grades of carbon and low alloy steels made by the L-D process may soon be available for bending, moderate forming, severe drawing, or special processing. Examples: Steel sheets chemically constituted and suitably processed for porcelain enameling (ASTM A424-58T) will probably be supplied in coils or cut lengths. Two grades are planned: 1 Commercial quality, for bending or moderate forming. 2. Special quality, for severely drawn, identified parts, within established breakage tolerances.

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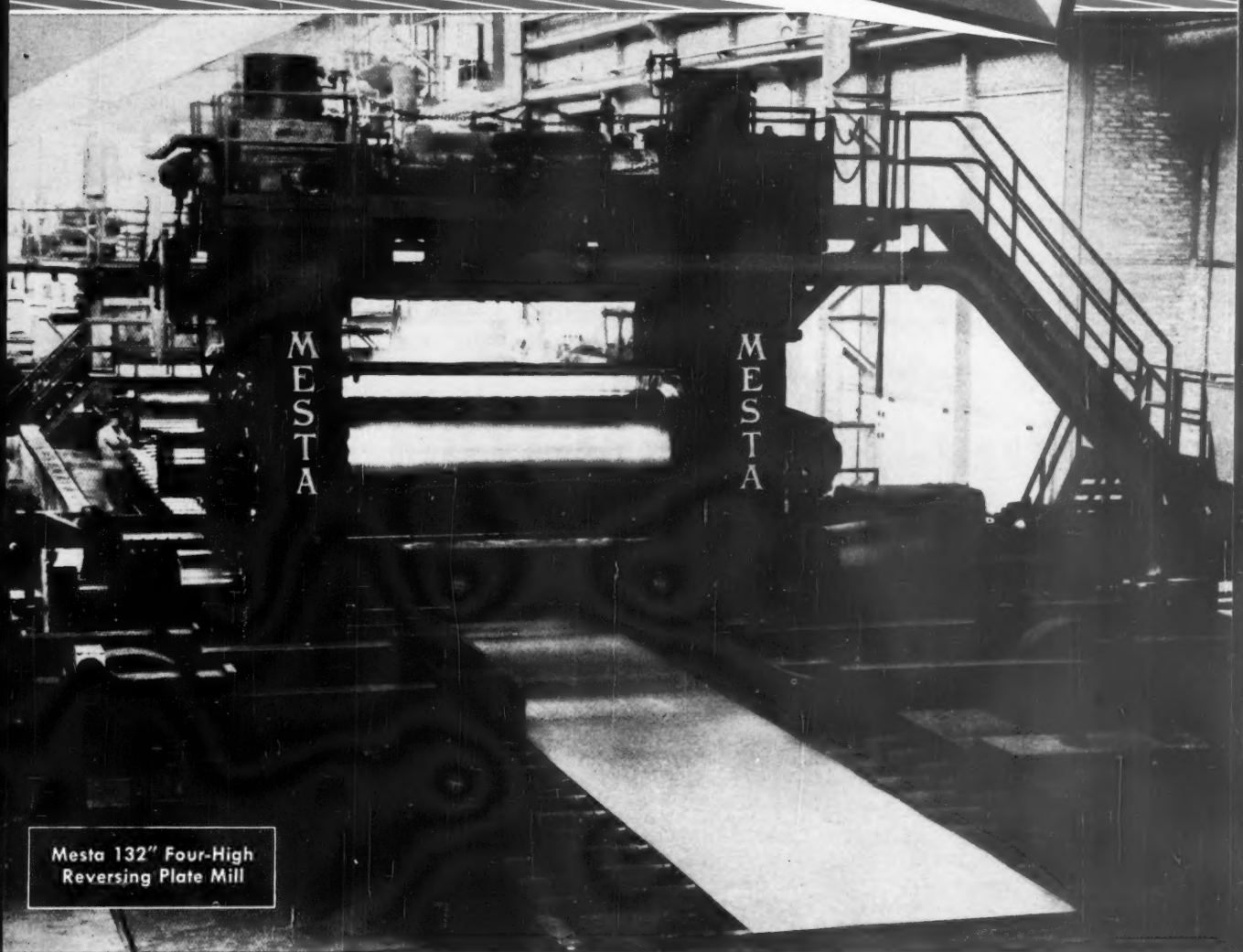

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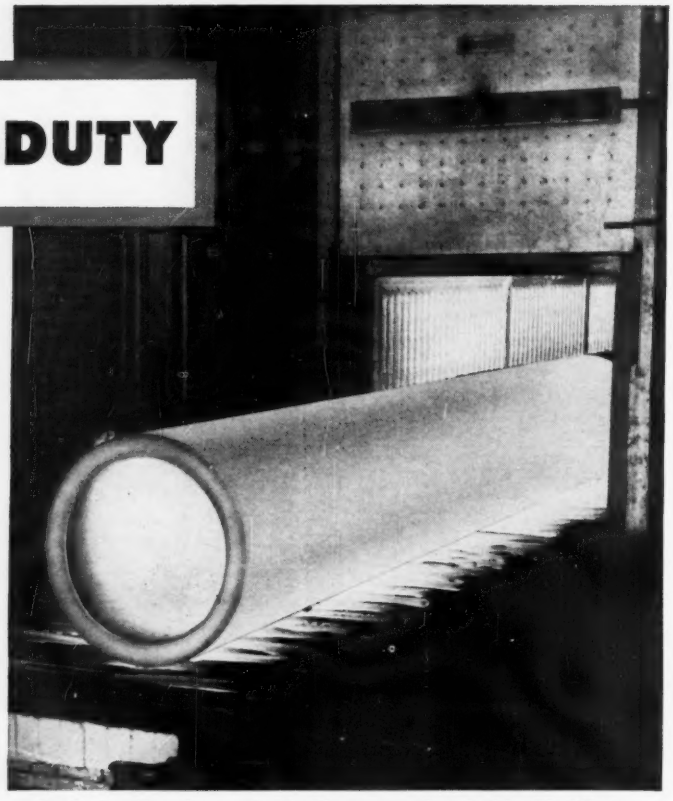
Sandusky Foundry and Machine Company did...

and now heat treats centrifugal castings of carbon and alloy steel at controlled, uniform temperatures up to 2050° F. with a



Sandusky Foundry and Machine Co. selected this Hevi-Duty Electric Car Bottom Furnace, rated at 2050° F. for their heat treating requirements. Casting being heat treated here weighs 13,700 lbs.

HEVI-DUTY CAR BOTTOM FURNACE

When your heat treating applications demand *quality production at uniform controlled temperatures*, Hevi-Duty can supply either electric or fuel-fired furnaces to meet your requirements.

For example: At Sandusky Foundry and Machine Co., Sandusky, Ohio, centrifugal steel castings up to 50 inches in diameter by 33 feet in length have been heat treated in a Hevi-Duty Electric Car Bottom Furnace. This furnace provides accurately controlled temperatures to 2050° F. in its 6′ x 6′ x 34′ long chamber. They use it to normalize, temper and anneal steel and stainless steel castings. Parts are either air cooled or water quenched.

The Hevi-Duty Car Bottom Furnace features five zones of temperature control, and by placing a dividing wall between the three forward and two rear zones, two separate loads with different temperature ranges can be treated simultaneously. Heating elements in side and end walls, ceiling, door and car bottom, plus three removable air-circulating fans help provide uniformity of temperature.

Whatever your particular heat treating application, there's a Hevi-Duty furnace designed to do the job. Car Bottom Furnaces are available with many arrangements and optional features—single or double end, retort type, controlled atmosphere, forced-air convection and others. Be sure to contact Hevi-Duty first for your heat processing equipment needs.

HEVI-DUTY

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for more information on electric or fuel-fired heat treating furnaces. Car Bottom Furnaces are fully described in Bulletin 644R.

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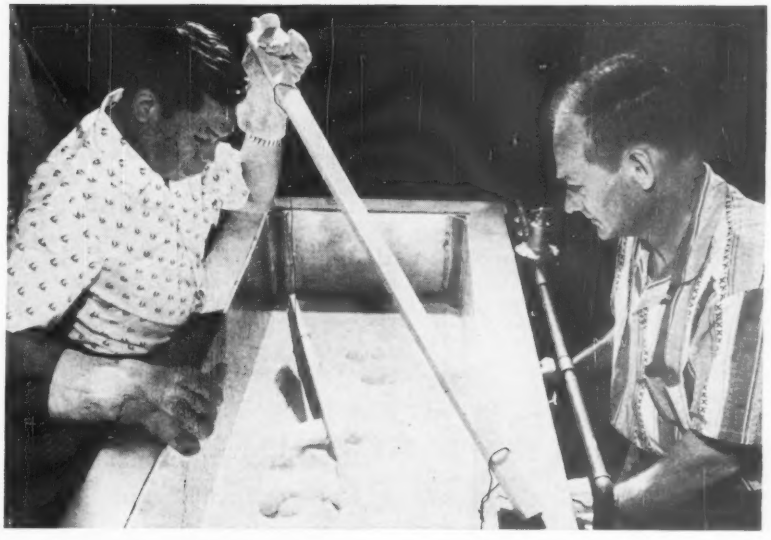

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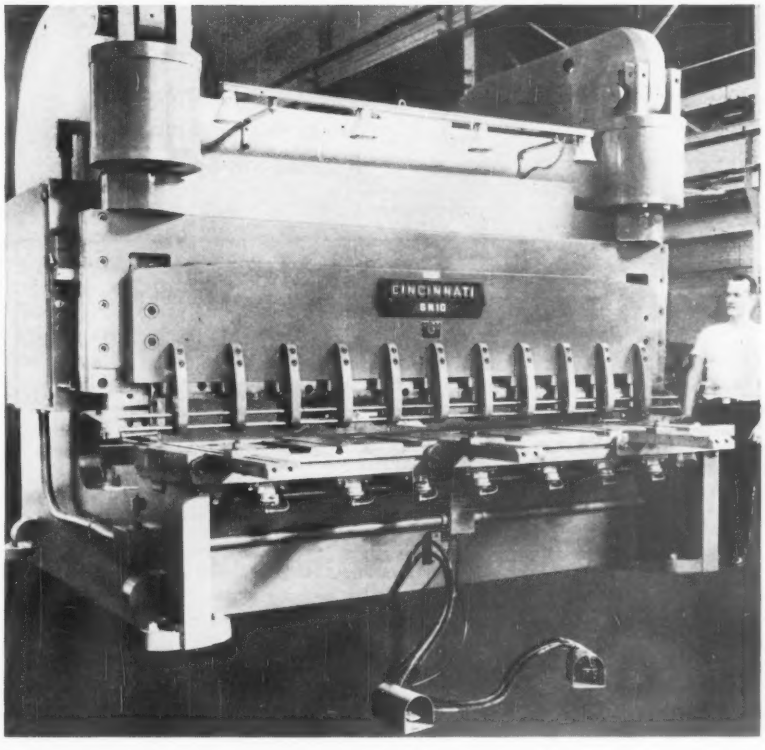
Rake of the upper knife is adjustable from 0 to ⅞ in. per foot. That permits the shearing of materials exceeding the nominal capacity of the machine by adjusting the rake upward.

When shearing materials lighter than the nominal machine capacity, the rake can be adjusted downward to an angle low enough to minimize distortion in the back piece. For operator convenience, centralized controls are provided for adjustment of rake, stroke, power back gage, and start-stop control.

Ball transfers in the table facilitate material handling and provide for greater operator efficiency. The gap frame permits the cutting of plates longer than the nominal machine length. Electric pedals provide remote control operation of the



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reduce stripping time to a minimum
and give more "out the door" products

Experience proves Soffel's Exothermic Sideboards increase yield all along the line. They require *less* set-up time, *less* track time, *less* storage space, *less* mold inventory. No crane is required—a limiting factor in conventional hot topping. Sideboards give you *more* sound steel and *more* flexibility in operations.

PRODUCT ADVANTAGES

- Eliminate permanent and conventional hot tops.
- Easy, and single, stripping of Big End Down molds.
- Sideboards are easily placed in head of mold by one man — crane only necessary on very large ingots.
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Soffel's Exothermic Sideboards increase ingot yield, assure top cut soundness and provide more ton steel out the door per ton of steel in the ingot.

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For further information, *write* Cincinnati Shaper Co., P. O. Box 111, Cincinnati 11, Ohio.

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RATINGS up to 8500 hp are available in the Type H line of flexible couplings made by Lovejoy. Intended for severe and continuous service, the new additions to the line are easy to install and incorporate individual load cushions which transfer the entire load. Metal to metal contact at jaws is eliminated.

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For further information, *write* Lovejoy Flexible Coupling Co., 4975 W. Lake St., Chicago 44, Ill.

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A MULTIPLE spindle lathe, the Type M Mult-Au-Matic, is designed to take advantage of high spindle speeds, a wide range of feeds, and modern cutting tools and materials. A variety of standard tools and heads have been designed for it.

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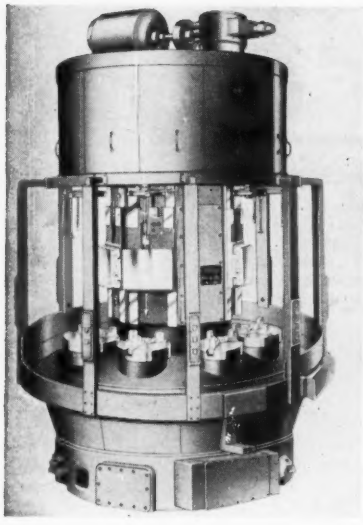

chines and 750 rpm on 12 spindle machines. A conical chip and coolant guard encloses the spindles and prevents chips from piling up. It directs chips and coolant to the outer chip trough for easy removal.

Another feature is the heavy duty, hydraulically actuated clutch and brake mechanism which is designed with constant followup (automatically compensates for wear and eliminates the need for adjustment). Lubricating oil is filtered.

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For further information, *write* Industrial Balancer Dept., Stewart-Warner Corp., 1826 Diversey Parkway, Chicago 14, Ill.

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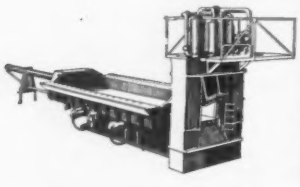

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Steel Prices: Status Quo

DESPITE recent price reductions in steel specialties, there's no evidence of a general weakening in the industry's price structure.

The moves that have been made in some stainless products and in galvanized conduit are isolated events triggered by special competitive conditions. They're symptomatic of the struggle for business that often develops in a recession, but they do not presage across-the-board reductions in the base prices of tonnage products—carbon sheets, bars, plates, structurals, or pipe.

Stainless producers have trimmed prices on some items to narrow the gap between their quotations and those of foreign mills. They have also made adjustments to meet competition from independent distributors who have reportedly been selling small quantities without charging extras. Since distributors sell stainless at parity with the mills but get a 10 per cent functional discount for handling it, they can undersell their suppliers by splitting the discount with customers. They sometimes do it when overstocked and hungry for business.

The price reductions in galvanized conduit reflect increasingly stiff competition from other materials.

THEY'LL HOLD THE LINE— The price cuts aren't likely to spread to tonnage products for several reasons—foremost of which is the profit squeeze. Employment costs have gone up $5 a ton since the last steel price increases in 1958, and productivity gains haven't kept pace. Many steelmakers will have a hard time covering their first quarter dividends. Earnings may improve moderately in the second and third quarters, but there's another wage hike in the offing. Employment costs will go up $2 to $3 more per ton on Oct. 1, when the United Steelworkers get the third installment of the wage package they negotiated in January, 1960.

Other reasons why prices won't deteriorate: 1. Demand is relatively inelastic. 2. Distribution methods are different (only 17.5 per cent of carbon steel shipments move through distributors vs. 40 per cent for stainless, and there's no functional discount on tonnage products that can be split with users). 3. The market bottomed out in December and is riding a gradual uptrend. As volume improves, marginal sellers will be less tempted to offer price concessions.

PRICE HIKES UNLIKELY— Because of the increasing pressure from competitive materials—nonferrous metals, plastics, paper, and wood—steelmakers will think twice about raising their prices even when demand strengthens appreciably. The availability of low priced imported steel, even in small quantities, will be a continuing deterrent.

The foreign threat in specialty products isn't quite as serious now as it was in 1960 and 1959 because European and Japanese mills have big backlogs of unfilled orders from their domestic customers. The deliveries they're quoting at home are so extended that U. S. mills can offer faster service and ship abroad at stateside prices. But the fact that foreign producers are allocating part of their capacity for shipments to the U. S. in the face of strong domestic demand indicates that they intend to maintain their position in the U. S. market and that they'll make more trouble when they catch up at home.

PRODUCTION RISING— Look for ingot production in the week ending Apr. 22 to substantially exceed the 1,720,000 tons that STEEL estimates the industry poured in the week ended Apr. 15. Output then was 1.4 per cent above the previous week's.

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*Current prices were published in the Apr. 10 issue and will appear in subsequent issues.

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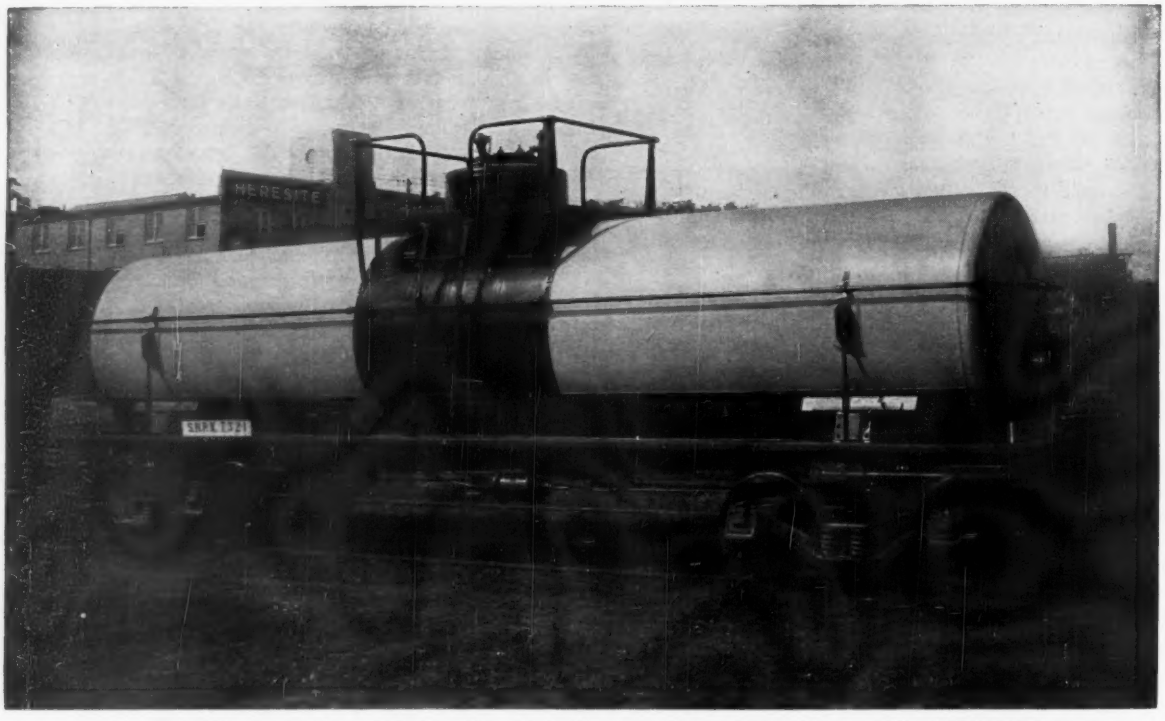

Since 1947 more than 3,000 railroad tank cars have been lined with HERESITE pure phenolic resinous coatings. These tank cars were used for transportation of corrosive chemicals and the majority of them for sulphuric acid transportation. In general this coating was of a dark brown color. Now there also are light colored HERESITE coatings available for the transportation of food products. These colors are cream color, aluminum, and yellow. The colored coatings have almost the same resistance as the original Heresite P-403 lining which is used exclusively for transportation of corrosive chemicals.

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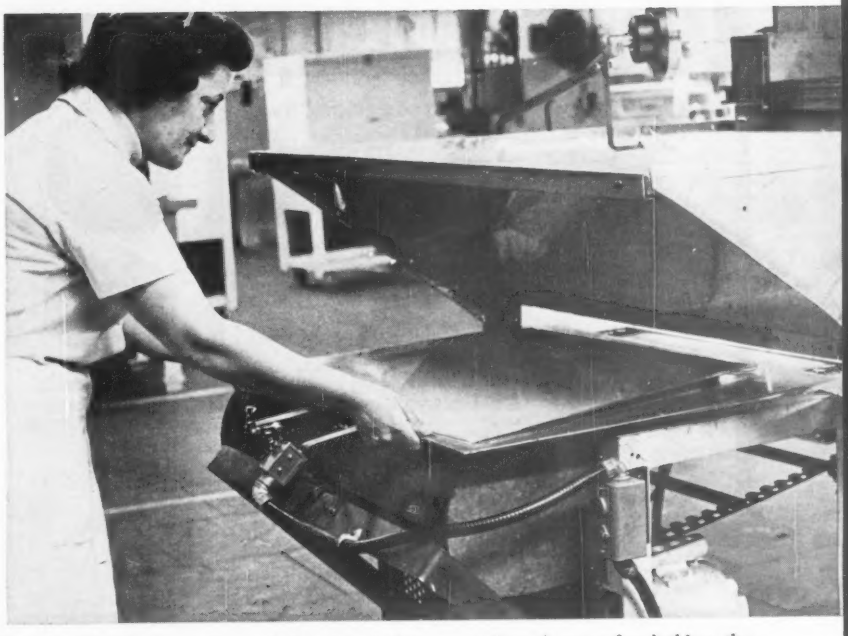
Future for EL Lighting Really Glows

INDUSTRIAL marketers envision a $250 million annual market within a decade or so for the newest thing in artificial lighting—electroluminescence (EL for short).

Some industry executives think that figure is highly speculative at this stage of development, but last year's volume totaled around $4 million, and it's predicted that business in the new light panels and lamps will exceed $7 million this year, probably topping $22 million by 1965.

This new form of lighting has been slowly developing since 1923, when the principle was discovered. Real development, however, didn't start until about 1947 and most of the progress made to date has been since 1950 when the principle was first commercially applied.



An electroluminescent lamp being inserted in an infrared oven for baking the phosphor coating on the lamp plate

• **Major Effort**—Though still in the laboratory stage in some respects, EL is reported already taking on some of the aspects of a major commercial and industrial effort—one that may eventually have tremendous impact on the $4 billion electric lighting industry.

EL is a means of converting electricity into artificial light without the use of the traditional incandescent lamps and fluorescent tubes. EL lamps and devices are paper-thin panels of plastic, glass, or metal with an electrical conductive film. Crystalline phosphors sandwiched between two electrically conducting surfaces absorb electrical energy and convert it into light when alternating current is applied. A soft "cold" light results from the electrical excitation of the phosphor powders.

• **Several Types**—In a typical EL lamp, one of the two conducting plates is covered with a phosphor in a suitable binder, over which is laid a plate made of plastic, glass, or metal, and coated on one side with a metal oxide film. When electricity is applied, the phosphor in the assembly glows in any one of several colors, principally green, blue, yellow, and orange, or white (depending on the phosphor).

There are several types of lamp construction: Flexible plastic, rigid plastic, rigid glass, and a steel backed ceramic. Particular advantages are claimed for each type. All constructions are available in sizes generally ranging up to 2 ft square. They are made in a variety of shapes and forms. They are long-lived (several thousand hours' use before starting to deteriorate) and they are economical to operate. The units are encapsulated in plastic, glass, or ceramic materials to provide protection against moisture, then mounted in suitable cases and fixtures of plastic or metal.

• **Glareless Light**—The lamps emit a uniform, diffused light of sufficient intensity to meet the requirements of a great many domestic, commercial, industrial, scientific, and military applications. A typical lamp has a light output of about 10 foot-Lamberts at 600 volts, 60 cycles. Brightness can be stepped up through increased voltage and frequency (possible with a converter) and color may be varied to some extent by mixes of phosphor in the assembly. There are no filaments, tubes, or vapors, and practically no heat is generated. Power requirements are extremely low (a 4 in. by 4 in. lamp supplied from a 120 volt, 60 cycle source draws only 0.07 watt).

EL lighting units at present include night lights, switchplates, aisle, floor and step lights, and similar adaptations. Panels are also available for such things as auto dashboards (Chrysler installations), instrument clusters, computer readouts, decorative tabletops, highway and airport directional signs, and street signs. They are also being offered for large area decorative lighting, such as in restaurants, lounges, night clubs, theaters, and similar places (the new lobby of the Rice Hotel, Houston).

• **Uses Unlimited**—Possible appli-

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cations are virtually without limit, though some technological difficulties remain to be overcome before the light's full potential can be realized. Likely uses in the relatively near future encompass display devices (advertising and point of sale signs), airplane instrument boards and cockpits, luminous walls, ceilings, baseboards, and draperies. Applications in the field of electronics are a distinct possibility, including mural television, computer logic elements, x-ray and other medical devices. Use in museums, laboratories, hospitals and public institutions, ships, submarines, and railroad trains is projected.

Utilization of EL for general lighting is probable. An executive of one of the companies in the field says that when electroluminescence can be marketed as a high intensity light source at standard home lighting voltage and frequency, it will rival every other form of present lighting.

• **Great Future** — Eventually, entire walls and ceilings will be made of EL materials, which can be made to glow softly or brightly, according to one's mood. That will be possible without use of accessory equipment to increase the voltage frequency (converters). All manufacturers engaged in the field are pushing research and development.

It is difficult at this stage to list all of the companies engaged in, or contributing to development of EL lighting in one way or another. Prominent in the field are: Miniature Lamp Dept., Cleveland, General Electric Co.; Lamp Div., Bloomfield, N. J., Westinghouse Electric Corp.; Sylvania Electric Products Inc., New York (subsidiary of General Telephone & Electronics Corp.); Electron Tube Div., Harrison, N. J., Radio Corp. of America; and U. S. Radium Corp., Morristown, N. J.

Others actively working in the field include various aircraft firms, business machine manufacturers, and electronic equipment makers and users. It's expected the field will broaden considerably as the market rises in stature.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Carpenter Cuts Prices on Some Stainless Products

Base prices on Type 410 stainless steel bars, billets, and wire were reduced 10 per cent, effective Apr. 10, by Carpenter Steel Co., Reading, Pa. The new prices are: Hot and cold finished bars, 31.50 cents; billets, 26.75 cents; wire, 29.75 cents.

Base prices of strip, and the recently announced prices for cold heading wire are unchanged.

The reductions were made in recognition of current competitive price offerings, Carpenter explained.

Tubular Goods . . .

Tubular Goods Prices, Page 122

With the return of good weather, tubemakers are benefiting from a seasonal pickup in standard pipe demand. Orders are more numerous, and aggregate volume is larger. Distributors are still ordering hand to mouth, buying minimum cars of 20 tons and reordering when they're about to run out of supplies. New England distributors have increased their orders moderately the last couple of weeks, but they're not stocking buttweld because prompt mill shipments are available.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 119 & 120

Moderate ordering of sheets beyond immediate consuming needs is reported, indicating that some consumers are beginning to get concerned about their inventories. That's particularly true in the case of galvanized sheets, on which deliveries have been tending to lengthen in recent weeks.

In general, galvanized sheet shipment promises range from six to eight weeks, but a little better than that can be done at times. Hot rolled sheets are available in two to three weeks, cold rolled in three to five, and specialties (such as electrical sheets and enameling stock) in about four.

Some sheetmakers report a slight upturn in automotive requirements, with auto sales better and car assemblies tending to pick up. However, this encouraging development is not general.

A mild, but disappointing, upturn in demand is noted from other consuming lines, including household

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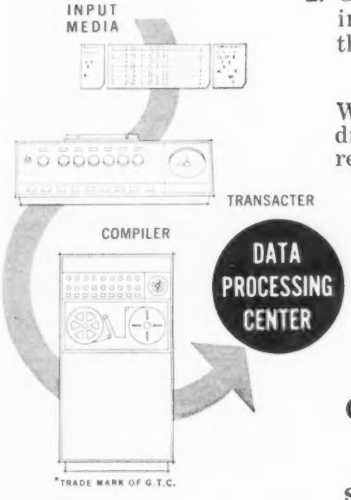

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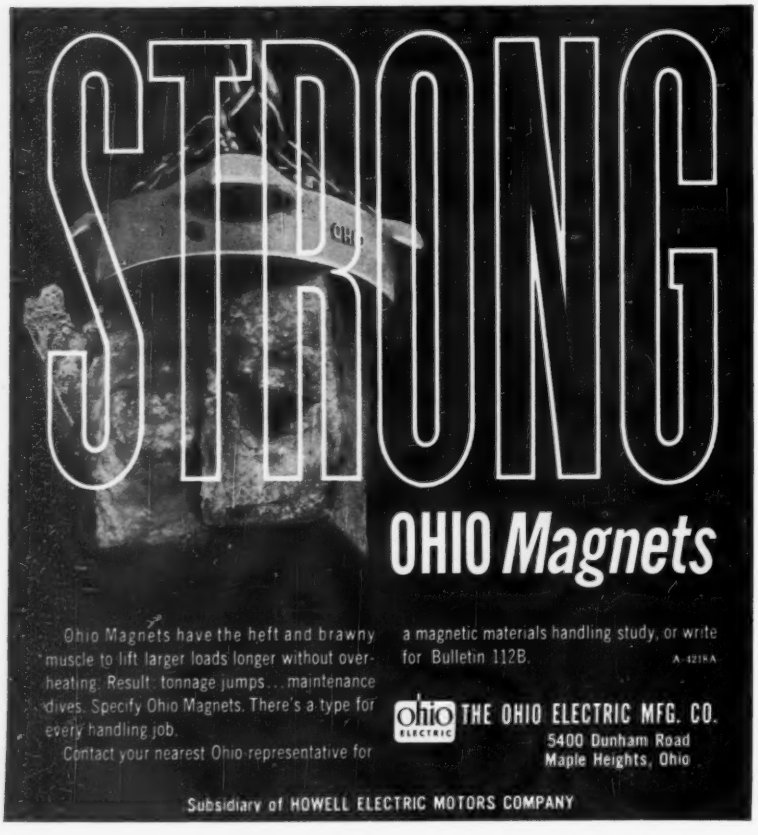
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Daily Steel Shipments in February Gain Slightly

Mill shipments of finished steel products in February totaled 4,250,720 net tons, up slightly on a daily average basis (because of the shorter month) from the 4.6 million tons moved in January, reports the American Iron & Steel Institute. In February, 1960, shipments were much larger, totaling 7.6 million tons.

Principal markets to which steel was shipped in February: Warehouses and distributors, 751,196 tons; automotive, 690,770; construction (including maintenance), 572,942; containers, 494,148; and machinery, industrial equipment, and tools, 261,775.

The major products shipped during the month included: Cold rolled sheets, 743,223 tons; hot rolled sheets, 454,389; electrolytic tin plate, 402,578; hot rolled bars (including light shapes), 402,475; plates, 394,966.

Tool Steel . . .

Tool Steel Prices, Page 122

Shipments of tool steels (excluding hollow drill steel) in February totaled 5751 net tons, reports the American Iron & Steel Institute. That was a decrease from the 6149 tons moved in January, and was down sharply from the 9660 tons shipped in February, 1960.

The total movement for the first two months of the year was 11,900 net tons, down considerably from the 19,237 tons moved in the same period a year ago.

Steel Bars . . .

Bar Prices, Page 118

Buying of steel bars by the automotive and affiliated industries is a little better. Also, a moderate gain in inquiry from diversified manufacturing industry is noted. Bar sellers, as a result, anticipate larger order volume this month than in March, despite the fewer working days.

Some consumers of cold finished bars say they will not permit in-

ventories of either bars or finished goods to fall any lower than they are now.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 119

Demand for reinforcing steel is rising steadily as the seasonal pickup in construction gains momentum. Contractors report prospects for commercial and industrial building look good, and there is a lot of work coming out for bids. Much of the new work is public in nature—schools, highways, and similar construction. Highway projects are absorbing a large volume of rebars.

Steel Service Centers in Pacific Northwest Busier

Sales managers of steel service centers in the Pacific Northwest report: Sales haven't picked up impressively in recent weeks, but inquiry is much more active than it was, indicating that consumers are becoming concerned about low inventories.

Considerable buying of small lots for quick delivery is reported. Activity in the flat rolled products leads at present. Building steel items are moving better seasonally.

The price situation still has weak spots, but service center operators are showing less concern about low priced imports. In Alaska, however, Seattle service centers report their business is being cut into by increasing imports of Japanese steel. Alaskan demand is off because of sluggish operations at the canneries.

Service center managements are concerned about small profit margins. They are paying more attention to cutting costs through increased operating efficiency.

Distributors . . .

Prices, Page 123

Steel service centers are booking a fair volume of business, with daily sales running slightly ahead of those in March. April has fewer working days, so there may not be a gain for the month as a whole. Most sellers expect the business curve to continue upward throughout the second quarter.

The improved sales volume is not reflected fully in the purchase of

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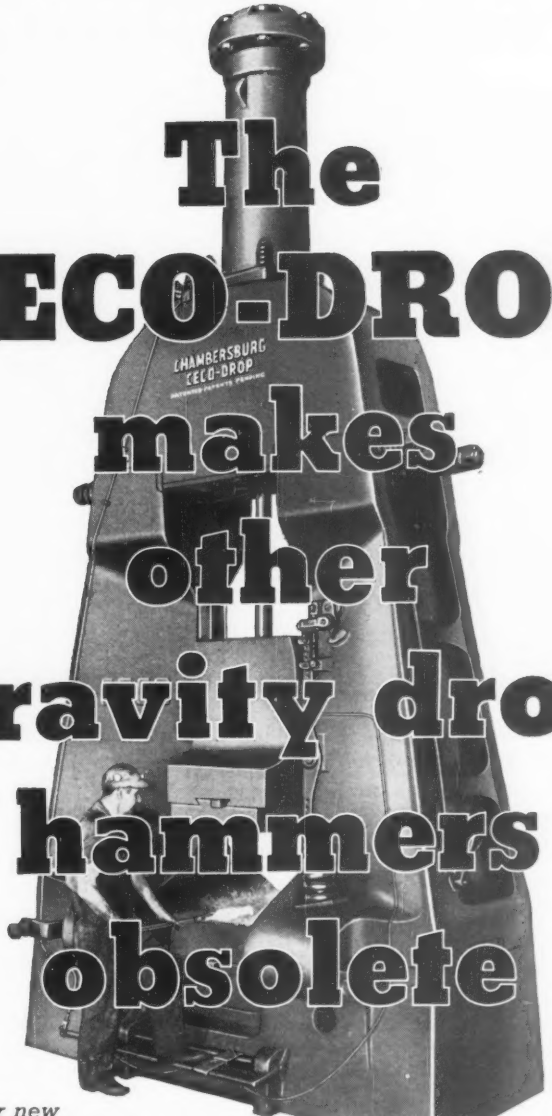

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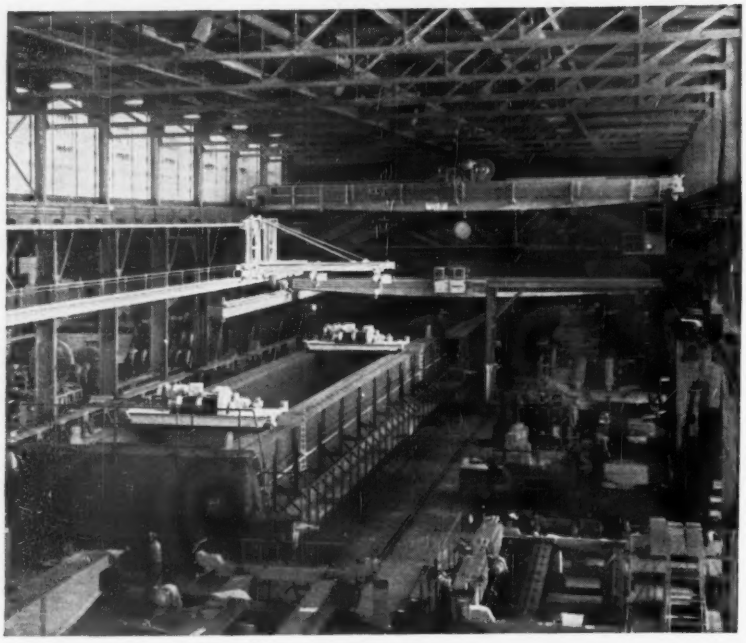

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replacement steel from mills. Mill deliveries are being extended in most districts; in Los Angeles, they stretch to two weeks in most categories and to ten weeks for galvanized sheets.

New Roofing and Siding Sheet Being Introduced

Granite City Steel Co., Granite City, Ill., is introducing a new, corrugated, galvanized steel roofing and siding sheet especially designed to protect against leakage in farm, ranch, industrial, and commercial buildings. Twin-Drain Strongbarn, as the sheet is called, is being offered after 15 months of experiments, including test installations on buildings in 30 different locations.

Plates . . .

Plate Prices, Page 118

Although demand for plates continues to fluctuate from week to week, the over-all trend appears to be slightly upward. Sellers of the heavy steel products in the Pittsburgh area say plates are the only heavy items now selling better than a month ago. Even so, business hasn't picked up as much as had been expected, and there has been no extension of delivery promises.

Users are showing little interest in ordering ahead. Producers report that the percentage of orders they're entering before the month of production is still small—perhaps 30 to 40 per cent of the month's total. Despite the sluggishness, platemakers are forecasting an 8 to 10 per cent rise in May sales contrasted with April's. Plate fabricating shops in New England are ordering slightly heavier tonnage for May shipment.

Pig Iron . . .

Pig Iron Prices, Page 123

Merchant pig iron business is slightly improved. New England foundries are buying close to requirements, amounting to just over 12,00 tons a month in the first quarter. Suppliers are able to take care of demand from inventory in most consuming districts. Eastern Co. (formerly Eastern Malleable Iron Co.) will close its malleable foundry

in Wilmington, Del., Apr. 30. No disposition of the property has been announced.

Iron producers in the Buffalo area expect Great Lakes shipments to be light at the start of the navigation season and somewhat heavier in May and June.

Youngstown Sheet & Tube Co. has blown in a second blast furnace at its Campbell (Ohio) Works.

Steel Ingot Production Maintains Steady Climb

STEELMAKING operations have risen steadily since mid-March and are expected to surge upward this week (ending Apr. 22). The increase in ingot production is required to meet the growing volume of orders from steel consumers, including the automotive industry. The forecast of a sharp rise this week is based primarily on developments in the Youngstown District.

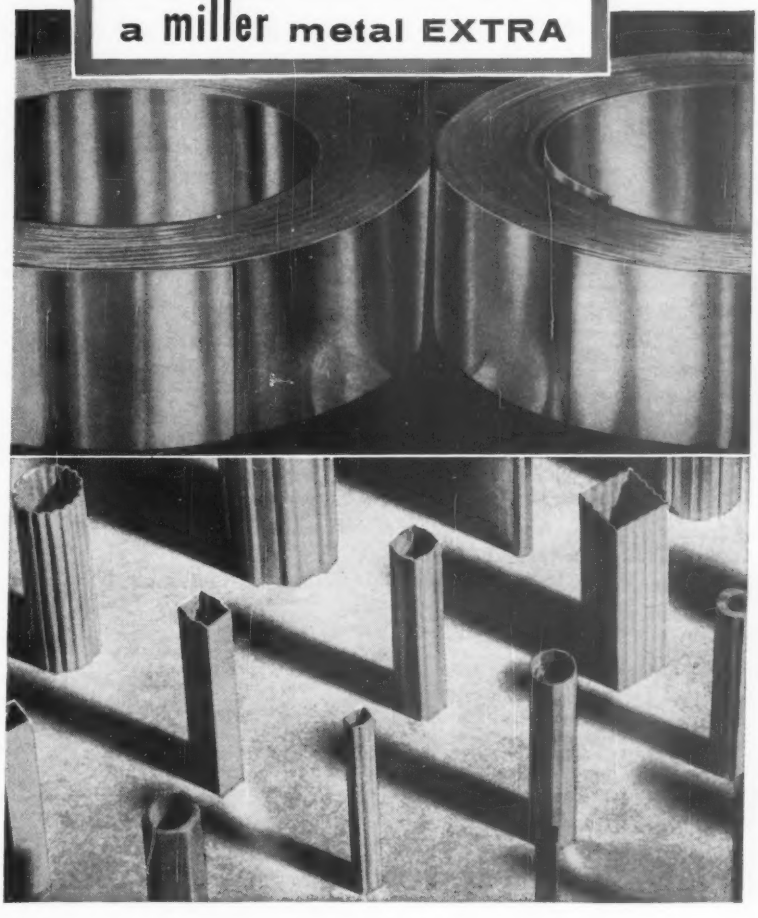
STEEL estimates production the week ended Apr. 15 at 1,720,000 tons, an increase of 1.4 per cent over the previous week's total of 1,696,000 tons. It's the first time production has exceeded 1.7 million tons since the week ended June 25, 1960.

• **Youngstown**—Youngstown Sheet & Tube Co. expects to start up its Brier Hill Works here this week (ending Apr. 22) after a three week close down for construction work on rolling mills. The seamless mills at the firm's Campbell (Ohio) Works, using tube rounds that were piled in anticipation of the Brier Hill closedown, are operating at a high rate to fill a big accumulation of orders. Indications are that the mills will work close to capacity at least the rest of the year.

Sharon Steel Corp. has placed an additional open hearth in operation. That automatically increases the number of turns in the blooming and bar mills.

• **Chicago**—STEEL estimates ingot production here for the week ended Apr. 15 at a rate of 64 per cent of 1960 capacity. That's a 1 point gain over the previous week when 359,113 tons were produced. Acme Steel Co. resumed melting Apr. 12, following a shutdown since the first of the month for repairs to the two cupolas at its oxygen converter plant.

a miller metal EXTRA



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ROLLING MILL DIVISION
Meriden, Connecticut

miller SINCE 1868

Tube Subsidiary
A. H. WELLS, INC.
Waterbury, Connecticut

• **Buffalo**—STEEL mills here have increased production, boosting the district steel rate to 41.5 per cent of capacity (based on 1960 ratings). Bethlehem Steel Co. lighted an open hearth and is using 14 of 35 furnaces. Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., also added an open hearth, making two of three units active.

• **Birmingham**—Steel ingot production in the Southern District eased slightly to 65.3 per cent of 1960 capacity for the week ended Apr. 15.

• **Philadelphia**—The uptrend here in steel output continues. The production index (based on average output for 1957-59) reached 100 for the week ended Apr. 8, establishing a high since last June.

• **Los Angeles** — An increase of nearly 1000 tons in Kaiser Steel production is an important factor in lifting the district's rate to about 74 per cent of capacity.

• **Cleveland**—Production here has increased for four consective weeks, reaching the highest level since the week ended Nov. 5, 1960, when about 91,670 tons were turned out. The low for 1961 to date was 62,039 tons for the week ended Mar. 18.

• **Detroit**—Ingot output is rising here. At least one more furnace has been added in the district, and with one exception mills are either programing more output or are holding operations steady.

March Steel Production Largest Since June, 1960

Steel ingot production in the first quarter of this year is estimated at 19,740,102 net tons, down sharply from the 34,740,893 tons poured in the same period of 1960, reports the American Iron & Steel Institute.

Production in March totaled 7,085,000 net tons, up 13.6 per cent from February's 6,239,098 tons, and the largest monthly total since June, 1960, when the furnaces poured 7.4 million tons.

The index of steelmaking and calculated weekly production both increased during March. The index for the month was 85.9 (1957-59=100). The index for February was 83.6. Calculated weekly production in the month was 1,599,000 tons vs. 1,559,774 in February.

Steel Ingot Production — March, 1961

Period	Open Hearth (Net tons)	Bessemer (Net tons)	Basic Oxygen Process (Net tons)	Electric (b) (Net tons)	Totals (Net tons)	Index (a)
1961						
January	5,539,900	49,609	213,255	613,240	6,416,004	77.8
February*	5,347,438	68,138	225,963	597,539	6,239,098	83.7
March†	6,069,000	76,000	282,000	658,000	7,085,000	85.9
1st Quarter	16,956,358	193,747	721,218	1,868,779	19,740,102	82.4
1960						
January	10,510,616	211,132	280,981	1,046,675	12,049,404	146.1
February	9,715,527	216,263	245,458	949,558	11,126,806	144.2
March	10,103,122	202,812	306,741	952,008	11,564,683	140.2
1st Quarter	30,329,265	630,207	833,180	2,948,241	34,740,893	143.4
April	8,603,306	105,336	302,763	766,452	9,777,857	123.5
May	7,844,140	73,010	309,505	603,817	8,830,472	107.9
June	6,441,594	80,344	314,766	568,169	7,404,873	92.7
2nd Quarter	22,889,040	258,690	927,034	1,938,438	26,013,202	107.4
1st Half	53,218,305	888,897	1,760,214	4,886,679	60,754,095	125.4
July	5,494,331	61,700	289,003	505,890	6,350,924	77.0
August	5,860,394	52,652	279,550	645,404	6,838,000	82.9
September	5,525,244	42,228	287,323	603,626	6,458,421	80.9
3rd Quarter	16,879,969	156,580	855,876	1,754,920	19,647,345	80.2
Nine Months	70,098,274	1,045,477	2,616,090	6,641,599	80,401,440	110.3
October	5,917,780	56,914	270,450	623,236	6,868,380	83.3
November	5,308,894	51,246	257,286	554,514	6,171,940	77.3
December	5,042,558	35,559	202,330	559,394	5,839,841	70.8
4th Quarter	16,269,232	143,719	730,066	1,737,144	18,880,161	77.1
2nd Half	33,149,201	300,299	1,585,942	3,492,064	38,527,506	78.7
Totals (1960)	86,367,506	1,189,196	3,346,156	8,378,743	99,281,601	101.9

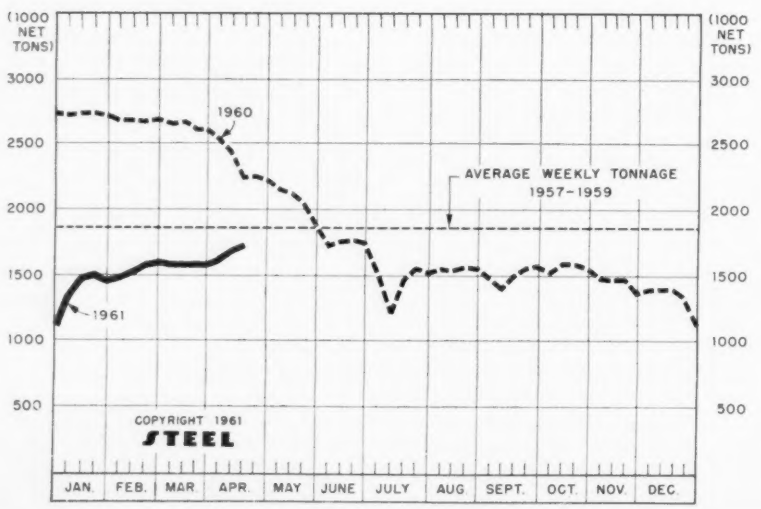
*Revised. †Preliminary. (a) Index based on average production 1957-59 as 100. (b) Includes crucible steel. Data from American Iron & Steel Institute.

STEEL INGOT PRODUCTION

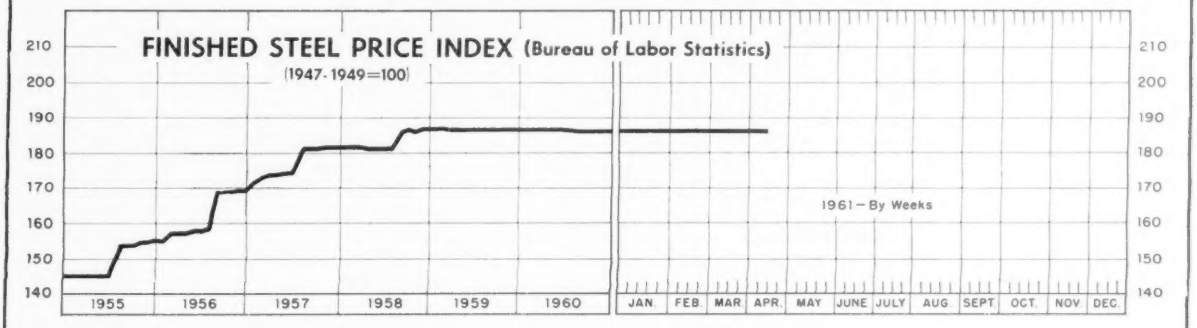
Weeks Ended	Net Tons	Change
Apr. 15	1,720,000*	+ 1.4%
Apr. 8	1,696,000	+ 3.9%
Apr. 1	1,632,000	+ 1.3%
Totals to Apr. 8		
1961	21,654,000	+ 41.6%
1960	37,067,000	

DISTRICTS	Week Ended —Apr. 8— Tons‡	Index†	Week Ended Apr. 1 Index†
Northeastern	267,196	100	92
Buffalo	77,884	80	77
Pittsburgh	330,910	82	80
Youngstown	110,488	65	65
Cleveland	83,336	90	89
Detroit	109,114	104	100
Chicago	359,113	96	92
Cincinnati	67,110	89	84
St. Louis	57,805	110	103
Southern	108,396	100	100
Western	125,097	107	106
Industry	1,696,000	91.0	87.6

*Estimated by STEEL. †1957-59=100. ‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Apr 11, 1961	Week Ago	Month Ago	Mar. Index	Year Ago
186.1	**186.1***	**186.2**	**186.2**	**186.8**

*Revised.

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Apr. 11

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.296
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe, Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Apr. 12 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	209.10
Index in cents per lb	6.713	6.713	6.713	6.713	5.665

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.62
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	60.06
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	59.61
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	61.06
Steelmaking Scrap, GT	39.50	30.67	37.67	33.66	55.00

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Apr. 12 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton	Apr. 12 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$61.00
Basic, Valley	66.00	66.00	66.00	66.00	60.00
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	63.76
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	64.26
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	60.50
Malleable, Chicago	66.50	66.50	66.50	66.50	60.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$36.50	$36.50	$34.50	$34.50	$54.50
No. 1 Heavy Melt, E. Pa.	43.00	43.00	42.00	35.00	56.00
No. 1 Heavy Melt, Chicago	39.00	39.50	36.50	31.50	54.50
No. 1 Heavy Melt, Valley	38.50	38.50	36.50	36.50	58.50
No. 1 Heavy Melt, Cleve.	35.50	35.50	33.50	33.50	57.50
No. 1 Heavy Melt, Buffalo	31.50	31.50	29.50	30.50	55.50
Rails, Rerolling, Chicago	59.50	61.50	58.50	53.50	72.50
No. 1 Cast, Chicago	43.50	44.50	42.50	45.50	51.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.00

Steel Prices

Code number following mill point indicates producing company. Key to producers, page 119; footnotes, page 121. Mill prices as reported to STEEL, Apr. 12, cents per pound except as otherwise noted. *Changes shown in italics.*

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Munhall, Pa. U5 ..... $76.00

INGOT, Alloy (NT)
Detroit S41 ..... $82.00
Economy, Pa. B14 ..... 82.00
Farrell, Pa. S3 ..... 82.00
Lowellville, O. S3 ..... 82.00
Midland, Pa. C18 ..... 82.00
Munhall, Pa. U5 ..... 82.00
Sharon, Pa. S3 ..... 82.00

BILLETS, BLOOMS & SLABS Carbon Rerolling (NT)
Bartonville, Ill. K4 ..... $82.00
Bessemer, Pa. U5 ..... 80.00
Buffalo R2 ..... 80.00
Clairton, Pa. U5 ..... 80.00
Ensley, Ala. T2 ..... 80.00
Fairfield, Ala. T2 ..... 80.00
Fontana, Calif. K1 ..... 90.50
Gary, Ind. U5 ..... 80.00
Johnstown, Pa. B2 ..... 80.00
Lackawanna, N.Y. B2 ..... 80.00
Munhall, Pa. U5 ..... 80.00
Owensboro, Ky. G8 ..... 80.00
S. Chicago, Ill. R2, U5 ..... 80.00
S. Duquesne, Pa. U5 ..... 80.00
Sterling, Ill. N15 ..... 80.00
Youngstown R2 ..... 80.00

Carbon, Forging (NT)
Bessemer, Pa. U5 ..... $99.50
Buffalo R2 ..... 99.50
Canton, O. R2 ..... 102.00
Clairton, Pa. U5 ..... 99.50
Conshohocken, Pa. A3 ..... 104.50
Ensley, Ala. T2 ..... 99.50
Fairfield, Ala. T2 ..... 99.50
Farrell, Pa. S3 ..... 99.50
Fontana, Calif. K1 ..... 109.00
Gary, Ind. U5 ..... 99.50
Geneva, Utah C11 ..... 99.50
Houston S5 ..... 104.50
Johnstown, Pa. B2 ..... 99.50
Lackawanna, N.Y. B2 ..... 99.50
LosAngeles B3 ..... 109.00
Midland, Pa. C18 ..... 99.50
Munhall, Pa. U5 ..... 99.50
Owensboro, Ky. C8 ..... 99.50
Seattle B3 ..... 100.00
Sharon, Pa. S3 ..... 99.50
S. Chicago R2, U5, W14 ..... 99.50
S. Duquesne, Pa. U5 ..... 99.50
S. SanFrancisco B3 ..... 109.00
Warren, O. C17 ..... 99.50

Alloy, Forging (NT)
Bethlehem, Pa. B2 ..... $119.00
Bridgeport, Conn. C32 ..... 119.00
Buffalo R2 ..... 119.00
Canton, O. R2, T7 ..... 119.00
Conshohocken, Pa. A3 ..... 126.00
Detroit S41 ..... 119.00
Economy, Pa. B14 ..... 119.00
Farrell, Pa. S3 ..... 119.00
Fontana, Calif. K1 ..... 140.00
Gary, Ind. U5 ..... 119.00
Houston S5 ..... 124.00
Ind. Harbor, Ind. Y1 ..... 119.00
Johnstown, Pa. B2 ..... 119.00
Lackawanna, N.Y. B2 ..... 119.00
LosAngeles B3 ..... 139.00
Lowellville, O. S3 ..... 119.00
Massillon, O. R2 ..... 119.00
Midland, Pa. C18 ..... 119.00
Munhall, Pa. U5 ..... 119.00
Owensboro, Ky. G8 ..... 119.00
Seattle(6) B3 ..... 140.00
Sharon, Pa. S3 ..... 119.00
S. Chicago R2, U5, W14 ..... 119.00
S. Duquesne, Pa. U5 ..... 119.00
Struthers, O. Y1 ..... 119.00
Warren, O. C17 ..... 119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ..... $122.50
Canton, O. R2 ..... 125.00
Cleveland R2 ..... 122.50
Gary, Ind. U5 ..... 122.50
S. Chicago, Ill. R2, W14 ..... 122.50
S. Duquesne, Pa. U5 ..... 122.50
Warren, O. C17 ..... 122.50

SKELP
Aliquippa, Pa. J5 ..... 5.05
Benwood, W.Va. W10 ..... 5.05
Ind. Harbor, Ind. Y1 ..... 5.05
Munhall, Pa. U5 ..... 5.05
Pittsburgh J5 ..... 5.05
Warren, O. R2 ..... 5.05
Youngstown R2, U5 ..... 5.05

WIRE RODS
AlabamaCity, Ala. R2 ..... 6.40
Aliquippa, Pa. J5 ..... 6.40
Alton, Ill. L1 ..... 6.60
Bartonville, Ill. K4 ..... 6.50
Buffalo W12 ..... 6.40
Cleveland A7 ..... 6.40
Donora, Pa. A7 ..... 6.40
Fairfield, Ala. T2 ..... 6.40
Houston S5 ..... 6.65
IndianaHarbor, Ind. Y1 ..... 6.40
Johnstown, Pa. B2 ..... 6.40
Joliet, Ill. A7 ..... 6.40
KansasCity, Mo. S5 ..... 6.65
Kokomo, Ind. C16 ..... 6.50
LosAngeles B3 ..... 7.20
Minnequa, Colo. C10 ..... 6.65
Monessen, Pa. P7 ..... 6.40
Pittsburg, Calif. C11 ..... 7.20
Portsmouth, O. P12 ..... 6.40
Roebling, N.J. R5 ..... 6.50
S. Chicago, Ill. R2, W14 ..... 6.40
SparrowsPoint, Md. B2 ..... 6.50
Sterling, Ill. (1)N15 ..... 6.40
Sterling, Ill. N15 ..... 6.50
Struthers, O. Y1 ..... 6.40
Worcester, Mass. A7 ..... 6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity, Ala. R2 ..... 5.50
Aliquippa, Pa. J5 ..... 5.50
Atlanta A11 ..... 5.70
Bessemer, Ala. T2 ..... 5.50
Bethlehem, Pa. B2 ..... 5.55
Birmingham C15 ..... 5.50
Clairton, Pa. U5 ..... 5.50
Fairfield, Ala. T2 ..... 5.50
Fontana, Calif. K1 ..... 6.30
Gary, Ind. U5 ..... 5.50
Geneva, Utah C11 ..... 5.50
Houston S5 ..... 5.60
Ind. Harbor, Ind. I-2, Y1 ..... 5.50
Johnstown, Pa. B2 ..... 5.55
Joliet, Ill. P22 ..... 5.50
KansasCity, Mo. S5 ..... 5.60
Lackawanna, N.Y. B2 ..... 5.55
LosAngeles B3 ..... 6.20
Minnequa, Colo. C10 ..... 5.80
Munhall, Pa. U5 ..... 5.50
Niles, Calif. P1 ..... 6.25
Phoenixville, Pa. P4 ..... 5.55
Portland, Oreg. O4 ..... 6.25
Seattle B3 ..... 6.25
S. Chicago, Ill. U5, W14 ..... 5.50
S. SanFrancisco B3 ..... 6.15
Sterling, Ill. N15 ..... 5.50
Struthers, O. Y1 ..... 5.50
Torrance, Calif. C11 ..... 6.20
Weirton, W.Va. W6 ..... 5.50

Wide Flange
Bethlehem, Pa. B2 ..... 5.55
Clairton, Pa. U5 ..... 5.50
Fontana, Calif. K1 ..... 6.45
IndianaHarbor, Ind. I-2 ..... 5.50
Lackawanna, N.Y. B2 ..... 5.55
Munhall, Pa. U5 ..... 5.50
Phoenixville, Pa. P4 ..... 5.55
S. Chicago, Ill. U5 ..... 5.50
Sterling, Ill. N15 ..... 5.50
Weirton, W.Va. W6 ..... 5.50

Alloy Std. Shapes
Aliquippa, Pa. J5 ..... 6.80
Clairton, Pa. U5 ..... 6.80
Gary, Ind. U5 ..... 6.80
Houston S5 ..... 6.90
Munhall, Pa. U5 ..... 6.80
S. Chicago, Ill. U5, W14 ..... 6.80

H.S., L.A., Std. Shapes
Aliquippa, Pa. J5 ..... 8.05
Bessemer, Ala. T2 ..... 8.05
Bethlehem, Pa. B2 ..... 8.10
Clairton, Pa. U5 ..... 8.05
Fairfield, Ala. T2 ..... 8.05
Fontana, Calif. K1 ..... 8.85
Gary, Ind. U5 ..... 8.05
Geneva, Utah C11 ..... 8.05
Houston S5 ..... 8.15
Ind. Harbor, Ind. I-2 Y1/8.05
Johnstown, Pa. B2 ..... 8.10
KansasCity, Mo. S5 ..... 8.15
Lackawanna, N.Y. B2 ..... 8.10
LosAngeles B3 ..... 8.75
Munhall, Pa. U5 ..... 8.05
Phoenixville, Pa. P4 ..... 8.10
Seattle B3 ..... 8.80
S. Chicago, Ill. U5, W14 ..... 8.05
S. SanFrancisco B3 ..... 8.70
Sterling, Ill. N15 ..... 7.75
Struthers, O. Y1 ..... 8.05

H.S., L.A., Wide Flange
Bethlehem, Pa. B2 ..... 8.10
Ind. Harbor, Ind. I-2 ..... 8.05
Lackawanna, N.Y. B2 ..... 8.10
Munhall, Pa. U5 ..... 8.05
S. Chicago, Ill. U5 ..... 8.05
Sterling, Ill. N15 ..... 7.75

PILING

BEARING PILES
BethlehemPa. B2 ..... 5.55
Ind. Harbor, Ind. I-2 ..... 5.50
Lackawanna, N.Y. B2 ..... 5.55
Munhall, Pa. U5 ..... 5.50
S. Chicago, Ill. I-2, U5 ..... 5.50

STEEL SHEET PILING
Ind. Harbor, Ind. I-2 ..... 6.50
Lackawanna, N.Y. B2 ..... 6.50
Munhall, Pa. U5 ..... 6.50
S. Chicago, Ill. I-2, U5 ..... 6.50
Weirton, W.Va. W6 ..... 6.50

PLATES

PLATES, Carbon Steel
AlabamaCity, Ala. R2 ..... 5.30
Aliquippa, Pa. J5 ..... 5.30
Ashland, Ky.(15) A10 ..... 5.30
Atlanta A11 ..... 5.50
Bessemer, Ala. T2 ..... 5.30
Clairton, Pa. U5 ..... 5.30
Claymont, Del. P4 ..... 5.30
Cleveland J5, R2 ..... 5.30
Coatesville, Pa. L7 ..... 5.30
Conshohocken, Pa. A3 ..... 5.30
Ecorse, Mich. G5 ..... 5.30
Fairfield, Ala. T2 ..... 5.30
Farrell, Pa. S3 ..... 5.30
Fontana, Calif.(30) K1 ..... 6.10
Gary, Ind. U5 ..... 5.30
Geneva, Utah C11 ..... 5.30
GraniteCity, Ill. G4 ..... 5.40
Houston S5 ..... 5.40
Ind. Harbor, Ind. I-2, Y1 ..... 5.30
Johnstown, Pa. B2 ..... 5.30
Lackawanna, N.Y. B2 ..... 5.30
Mansfield, O. E6 ..... 5.30
Minnequa, Colo. C10 ..... 6.15
Munhall, Pa. U5 ..... 5.30
Newport, Ky. A2 ..... 5.30
Pittsburgh J5 ..... 5.30
Riverdale, Ill. A1 ..... 5.30
Seattle B3 ..... 6.20
Sharon, Pa. S3 ..... 5.30
S. Chicago, Ill. U5, W14 ..... 5.30
SparrowsPoint, Md. B2 ..... 5.30
Sterling, Ill. N15 ..... 5.30
Steubenville, O. W10 ..... 5.30
Warren, O. R2 ..... 5.30
Youngstown U5, Y1 ..... 5.30
Youngstown(27) R2 ..... 5.30

PLATES, Carbon Abras. Resist.
Claymont, Del. P4 ..... 7.05
Fontana, Calif. K1 ..... 7.85
Geneva, Utah C11 ..... 7.05
Houston S5 ..... 7.15
Johnstown, Pa. B2 ..... 7.05
SparrowsPoint, Md. B2 ..... 7.05

PLATES, Wrought Iron
Economy, Pa. B14 ..... 14.10

PLATES, H.S., L.A.
Aliquippa, Pa. J5 ..... 7.95
Ashland, Ky. A10 ..... 7.95
Bessemer, Ala. T2 ..... 7.95
Clairton, Pa. U5 ..... 7.95
Claymont, Del. P4 ..... 7.95
Cleveland J5, R2 ..... 7.95
Coatesville, Pa. L7 ..... 7.95
Conshocken, Pa. A3 ..... 7.95
Economy, Pa. B14 ..... 7.95
Ecorse, Mich. G5 ..... 7.95
Fairfield, Ala. T2 ..... 7.95
Farrell, Pa. S3 ..... 7.95
Fontana, Calif.(30) K1 ..... 8.75
Gary, Ind. U5 ..... 7.95
Geneva, Utah C11 ..... 7.95
Houston S5 ..... 8.05
Ind. Harbor, Ind. I-2, Y1 ..... 7.95
Johnstown, Pa. B2 ..... 7.95
Munhall, Pa. U5 ..... 7.95
Pittsburgh J5 ..... 7.95
Seattle B3 ..... 8.85
Sharon, Pa. S3 ..... 7.95
S. Chicago, Ill. U5, W14 ..... 7.95
SparrowsPoint, Md. B2 ..... 7.95
Sterling, Ill. N15 ..... 7.625
Warren, O. R2 ..... 7.95
Youngstown U5, Y1 ..... 7.95

PLATES, Alloy
Aliquippa, Pa. J5 ..... 7.50
Claymont, Del. P4 ..... 7.50
Coatesville, Pa. L7 ..... 7.50
Economy, Pa. B14 ..... 7.50
Farrell, Pa. S3 ..... 7.50
Fontana, Calif. K1 ..... 8.30
Gary, Ind. U5 ..... 7.50
Houston S5 ..... 7.60
Ind. Harbor, Ind. Y1 ..... 7.50
Johnstown, Pa. B2 ..... 7.50
Lowellville, O. S3 ..... 7.50
Munhall, Pa. U5 ..... 7.50
Newport, Ky. A2 ..... 7.50
Pittsburgh J5 ..... 7.50
Seattle B3 ..... 8.40
Sharon, Pa. S3 ..... 7.50
S. Chicago, Ill. U5, W14 ..... 7.50
SparrowsPoint, Md. B2 ..... 7.50
Youngstown Y1 ..... 7.50

FLOOR PLATES
Cleveland J5 ..... 6.375
Claymont, Del. P4 ..... 6.375
Conshohocken, Pa. A3 ..... 6.375
Ind. Harbor, Ind. I-2 ..... 6.375
Munhall, Pa. U5 ..... 6.375
Pittsburgh J5 ..... 6.375
S. Chicago, Ill. U5 ..... 6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ..... 5.55
Ashland l.c.l.(15) A10 ..... 6.05
Cleveland c.l. R2 ..... 6.05
Warren, O. R2 ..... 6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala. City, Ala.(9) R2 ..... 5.675
Aliquippa, Pa.(9) J5 ..... 5.675
Alton, Ill. L1 ..... 5.875
Atlanta(9) A11 ..... 5.875
Bessemer, Ala.(9) T2 ..... 5.675
Birmington(9) C15 ..... 5.675
Buffalo(9) R2 ..... 5.675
Canton, O. (23) R2 ..... 6.15
Clairton, Pa.(9) U5 ..... 5.675
Cleveland(9) R2 ..... 5.675
Ecorse, Mich.(9) G5 ..... 5.675
Emeryville, Calif. J7 ..... 6.425
Fairfield, Ala.(9) T2 ..... 5.675
Fairless, Pa.(9) U5 ..... 5.825
Fontana, Calif.(9) K1 ..... 6.375
Gary, Ind.(9) U5 ..... 5.675
Houston(9) S5 ..... 5.925
Ind. Harbor(9) I-2, Y1 ..... 5.675
Johnstown, Pa.(9) B2 ..... 5.675
Joliet, Ill. P2 ..... 5.675
KansasCity, Mo.(9) S5 ..... 5.925
Lackawanna(9) B2 ..... 5.675
LosAngeles(9) B3 ..... 6.375
Massillon, O.(23) R2 ..... 6.15
Midland, Pa.(23) C18 ..... 6.025
Milton, Pa. M18 ..... 5.825
Minnequa, Colo. C10 ..... 6.125
Niles, Calif. P1 ..... 6.375
Owensboro, Ky.(9) G8 ..... 6.025
Pittsburg, Calif.(9) C11 ..... 6.375
Pittsburgh(9) J5 ..... 5.675
Portland, Oreg. O4 ..... 6.425
Riverdale, Ill.(9) A1 ..... 5.675
Seattle(9) A24, B3, N15 ..... 6.425
S. Ch'c'go(9) R2, U5, W14 ..... 5.675
S. Duquesne, Pa.(9) U5 ..... 5.675
S. SanFran., Calif.(9) B3 ..... 6.425
Sterling, Ill.(1)(9) N15 ..... 5.675
Sterling, Ill.(9) N15 ..... 5.775
Struthers, O.(9) Y1 ..... 5.675
Tonawanda, N.Y. B12 ..... 5.675
Torrance, Calif.(9) C11 ..... 6.375
Warren, O. C17 ..... 6.025
Youngstown(9) R2, U5 ..... 5.675

BARS, Hot-Rolled Alloy
Aliquippa, Pa. J5 ..... 6.725
Bethlehem, Pa. B2 ..... 6.725
Bridgeport, Conn. C32 ..... 6.80
Buffalo R2 ..... 6.725
Canton, O. R2, T7 ..... 6.725
Clairton, Pa. U5 ..... 6.725
Detroit S41 ..... 6.725
Economy, Pa. B14 ..... 6.725
Ecorse, Mich. G5 ..... 6.725
Farrell, Pa. S3 ..... 6.725
Fontana, Calif. K1 ..... 7.775
Gary, Ind. U5 ..... 6.725
Houston S5 ..... 6.975
Ind. Harbor, Ind. I-2, Y1 ..... 6.725
Johnstown, Pa. B2 ..... 6.725
KansasCity, Mo. S5 ..... 6.975
Lackawanna, N.Y. B2 ..... 6.725
LosAngeles B3 ..... 7.775
Lowellville, O. S3 ..... 6.725
Massillon, O. R2 ..... 6.725
Midland, Pa. C18 ..... 6.725
Owensboro, Ky. G8 ..... 6.725
Pittsburgh J5 ..... 6.725
Seattle(6) B3 ..... 7.825
Sharon, Pa. S3 ..... 6.725
S. Chicago R2, U5, W14 ..... 6.725
S. Duquesne, Pa. U5 ..... 6.725
Struthers, O. Y1 ..... 6.725
Warren, O. C17 ..... 6.725
Youngstown U5 ..... 6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa, Pa. J5 ..... 8.30
Bessemer, Ala. T2 ..... 8.30
Bethlehem, Pa. B2 ..... 8.30
Clairton, Pa. U5 ..... 8.30
Cleveland R2 ..... 8.30
Ecorse, Mich. G5 ..... 8.30
Fairfield, Ala. T2 ..... 8.30
Fontana, Calif. K1 ..... 9.00
Gary, Ind. U5 ..... 8.30
Houston S5 ..... 8.55
Ind. Harbor, Ind. Y1 ..... 8.30
Johnstown, Pa. B2 ..... 8.30
KansasCity, Mo. S5 ..... 8.55
Lackawanna, N.Y. B2 ..... 8.30
LosAngeles B3 ..... 9.00
Pittsburgh J5 ..... 8.30
Seattle B3 ..... 9.05
S. Chicago, Ill. R2, W14 ..... 8.30
S. Duquesne, Pa. U5 ..... 8.30
S. SanFrancisco B3 ..... 9.05
Sterling, Ill. N15 ..... 7.925
Struthers, O. Y1 ..... 8.30
Youngstown U5 ..... 8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem, Pa.(9) B2 ..... 5.885
Houston(9) S5 ..... 5.925
KansasCity, Mo.(9) S5 ..... 5.925
Lackawanna(9) B2 ..... 5.675
Sterling, Ill. N15 ..... 5.775
Sterling, Ill.(1) N15 ..... 5.675
Tonawanda, N.Y. B12 ..... 5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa, Pa. J5 ..... 5.675
Atlanta A11 ..... 5.875
Joliet, Ill. P22 ..... 5.675
Minnequa, Colo. C10 ..... 6.125
Niles, Calif. P1 ..... 6.375
Pittsburgh J5 ..... 5.675
Portland, Oreg. O4 ..... 6.425
SanFrancisco S7 ..... 6.52
Seattle B3 ..... 6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy, Pa. B14 ..... 16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa, Pa. J5 ..... 6.80
Clairton, Pa. U5 ..... 6.80
Gary, Ind. U5 ..... 6.80
Houston S5 ..... 7.05
KansasCity, Mo. S5 ..... 7.05
Pittsburgh J5 ..... 6.80
Youngstown U5 ..... 6.80

BARS, C.F. Leaded (Including leaded extra) Carbon
LosAngeles P2, S30 ..... 11.75*

Alloy
Ambridge, Pa. W18 ..... 10.175
BeaverFalls, Pa. M12 ..... 10.175
Camden, N.J. P13 ..... 10.35
Chicago W18 ..... 10.175
Elyria, O. W8 ..... 10.175
Monaca, Pa. S17 ..... 10.175
Newark, N.J. W18 ..... 10.35
SpringCity, Pa. K3 ..... 10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge, Pa. W18 ..... 7.65
BeaverFalls, Pa. M12, R2 ..... 7.65
Birmingham C15 ..... 8.25
Buffalo B5 ..... 7.70
Camden, N.J. P13 ..... 8.10
Carnegie, Pa. C12 ..... 7.65
Chicago W18 ..... 7.65
Cleveland A7, C20 ..... 7.65
Detroit B5, H5, P17 ..... 7.85
Detroit S41 ..... 7.65
Donora, Pa. A7 ..... 7.65
Elyria, O. W8 ..... 7.65
FranklinPark, Ill. N5 ..... 7.65
Gary, Ind. R2 ..... 7.65
GreenBay, Wis. F7 ..... 7.65
Hammond, Ind. J5, L2 ..... 7.65
Hartford, Conn. R2 ..... 8.15
Harvey, Ill. B5 ..... 7.65
LosAngeles(49) S30 ..... 9.10
LosAngeles(49) P2, R2 ..... 9.10
Mansfield, Mass. B5 ..... 8.20
Massillon, O. R2, R8 ..... 7.65
Midland, Pa. C18 ..... 7.65
Monaca, Pa. S17 ..... 7.65
Newark, N.J. W18 ..... 8.10
NewCastle, Pa.(17) B4 ..... 7.65
Pittsburgh J5 ..... 7.65
Plymouth, Mich. P5 ..... 7.90
Putnam, Conn. W18 ..... 8.20
Readville, Mass. C14 ..... 8.20
Seattle(49) S30 ..... 9.10
S. Chicago, Ill. W14 ..... 7.65
SpringCity, Pa. K3 ..... 8.10
Struthers, O. Y1 ..... 7.65
Warren, O. C17 ..... 7.65
Waukegan, Ill. A7 ..... 7.65
Willimantic, Conn. J5 ..... 8.15
Youngstown F3, Y1 ..... 7.65

BARS, Cold-Finished Alloy (Turned and Ground
Cumberland, Md.(5) C19 ..... 6.55

BARS, Cold-Finished Alloy
Ambridge, Pa. W18 ..... 9.025
BeaverFalls, Pa. M12, R2 ..... 9.025
Bethlehem, Pa. B2 ..... 9.025
Bridgeport, Conn. C32 ..... 9.175
Buffalo B5 ..... 9.025
Camden, N.J. P13 ..... 9.20
Canton, O. T7 ..... 9.025
Carnegie, Pa. C12 ..... 9.025
Chicago W18 ..... 9.025
Cleveland A7, C20 ..... 9.25
Detroit B5, P17 ..... 9.225
Detroit H5, S41 ..... 9.025
Donora, Pa. A7 ..... 9.025
Elyria, O. W8 ..... 9.025
FranklinPark, Ill. N5 ..... 9.025
Gary, Ind. R2 ..... 9.025
GreenBay, Wis. F7 ..... 9.025
Hammond, Ind. J5, L2 ..... 9.025
Hartford, Conn. R2 ..... 9.325
Harvey, Ill. R5 ..... 9.025
Lackawanna, N.Y. B3 ..... 9.025
LosAngeles P2, S30 ..... 11.00
Mansfield, Mass. B5 ..... 9.325
Massillon, O. R2, R8 ..... 9.025
Midland, Pa. C18 ..... 9.025
Monaca, Pa. S17 ..... 9.025
Newark, N.J. W18 ..... 9.20
Plymouth, Mich. P5 ..... 9.225
S. Chicago, Ill. W14 ..... 9.025
SpringCity, Pa. K3 ..... 9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan, Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.00
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1.5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5, ...7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5 .20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4) (44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4)F5 ....5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland Ky A10	7.225	7.475
Canton,O. R2	....7.125	....
Fairfield,Ala. T2	7.125	7.475
Gary,Ind. U5	....7.125	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	....7.125	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	....7.225	....
SparowsPt. B2	.7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

Sheets, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 .....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ...6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,Wa.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calument Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S12 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1 7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ....7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
FranklinPark,Ill. T6 ..7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23.7.425
NewHaven,Conn. D2 ...7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.425
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ...8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. S8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.55	22.95	27.80
Buffalo W12	18.55	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R. Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ..7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5 .7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.10	9.35	9.75
Fairless,Pa. U5	9.10	9.35	9.75
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (1¼ lb coating in coils)

	Base Box 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Hot Dipped 1.25 Common Coke	lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	....	9.875*	11.70	12.40	13.55
Vandergrift,Pa. U5	....	9.875*	11.70	12.40	13.55
Warren,O. R2	....	9.875*	11.70	12.40	13.55
Zanesville,O. A10	....	....	11.70†	12.40	13.55

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	....	19.70	20.20	20.70 ....
Vandergrift,Pa. U5	..	17.10	18.10	19.70	20.20	20.70 15.70
Warren,O. R2	....	....	....	....	....	.... 15.70‡

*Semiprocessed. †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16...8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2...8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 .....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2 .12.65
KansasCity,Mo. U3 ...12.90
LosAngeles(2) B3 .....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ..12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ..10.075
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....9.75
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt., Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ...16.65
Johnstown,Pa. B2 ....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S41 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 ....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ...13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4 ....17.15
Monessen,Pa. P16 .....17.15
Roebing,N.J. R5 .....17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6 .....12.35
Baltimore T6 .....12.65
Boston T6 .....12.65
Buffalo W12 .....12.35
Chicago W13 .....12.45
Cleveland A7 .....12.35
Crawfordsville,Ind. M8 .12.35
Dover,O. G6 .....12.35
Evanston,Ill. M22 .....12.45
Farrell,Pa. S3 .....12.35
Fostoria,O. S1 .....12.35
FranklinPark,Ill. T6 ..12.45
Kokomo,Ind. C16 .....12.35
Massillon,O. R8 .....12.35
Milwaukee C23 .....12.55
Monessen,Pa. P7, P16..12.35
NewCastle,Pa. M23 ....12.35
Palmer,Mass. W12 .....12.65
Pawtucket,R.I. N8 ....12.65
Philadelphia P24 .....12.65
Riverdale,Ill. A1 .....12.45
Rome,N.Y. R6 .....12.35
Sharon,Pa. S3 .....12.35
Trenton,N.J. R5 .....12.65
Warren,O. B9 .....12.35
Worcester,Mass. A7, T6.12.65

NAILS, Stock Sizes Col.

AlabamaCity,Ala. R2 ...173
Aliquippa,Pa. J5 173
Atlanta A11 173
Bartonville,Ill. K4 175
Chicago W13 173
Cleveland A9 173
Crawfordsville,Ind. M8 ..175
Donora,Pa. A7 173
Duluth A7 173
Fairfield,Ala. T2 173
Houston S5 178
Jacksonville,Fla. M8 175
Johnstown,Pa. B2 173
Joliet,Ill. A7 173
KansasCity,Mo. S5 178
Kokomo,Ind. C16 175
Minnequa,Colo. C10 178
Monessen,Pa. P7 173
Pittsburg,Calif. C11 192
Rankin,Pa. A7 173
S.Chicago,Ill. R2 173
SparrowsPt.,Md. B2 175
Sterling,Ill.(7) N15 175
Worcester,Mass. A7 179

(To Wholesalers: per cwt)

Galveston,Tex. D7 ....$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10 .$10.10

POLISHED STAPLES Col.

AlabamaCity,Ala. R2 ...175
Aliquippa,Pa. J5 173
Atlanta A11 173
Bartonville,Ill. K4 175
Crawfordsville,Ind. M8 ..177
Donora,Pa. A7 173
Duluth A7 173
Fairfield,Ala. T2 173
Houston S5 180
Jacksonville,Fla. M8 177
Johnstown,Pa. B2 173
Joliet,Ill. A7 173
KansasCity,Mo. S5 180
Kokomo,Ind. C16 177
Minnequa,Colo. C10 178
Pittsburg,Calif. C11 194
Rankin,Pa. A7 173
S. Chicago,Ill. R2 175
SparrowsPt.,Md. B2 175
Sterling,Ill.(7) N15 175
Worcester,Mass. A7 179

TIRE WIRE, Automatic Baler (14½ Ga.) per 97 lb net box) Coil No. 3150

AlabamaCity,Ala. R2 ..$8.78
Atlanta A11 .....10.36
Bartonville,Ill. K4 .....8.88
Buffalo W12 .....10.26
Chicago W13 .....9.24
Crawfordsville,Ind. M8..8.88
Donora,Pa. A7 .....8.78
Duluth A7 .....8.78
Fairfield,Ala. T2 .....8.78
Houston S5 .....10.51
Jacksonville,Fla. M8 ...8.88
Johnstown,Pa. B2 .....8.78
Joliet,Ill. A7 .....8.78
KansasCity,Mo. S5 ....10.51
Kokomo,Ind. C16 .....8.88
LosAngeles B3 .....9.20
Minnequa,Colo. C10 ....9.02
Pittsburg,Calif. C11 ....9.44
S.Chicago,Ill. R2 .....8.78
S.SanFrancisco C10 ....9.94
SparrowsPt.,Md. B2 ....8.88
Sterling,Ill.(37) N15 ...8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2 ..$9.06
Atlanta A11 .....10.70
Bartonville,Ill. K4 ....9.16
Buffalo W12 .....10.60
Chicago W13 .....9.54
Crawfordsville,Ind. M8..9.16
Donora,Pa. A7 .....9.06
Duluth A7 .....9.06
Fairfield,Ala. T2 .....9.06
Houston S5 .....10.85
Jacksonville,Fla. M8 ....9.16
Johnstown,Pa. B2 .....9.06
Joliet,Ill. A7 .....9.06
KansasCity,Mo. S5 ....10.85
Kokomo,Ind. C16 .....9.16
LosAngeles B3 .....9.50
Minnequa,Colo. C10 ....9.30
Pittsburg,Calif. C11 ....9.75
S.Chicago,Ill. R2 .....9.06
S.SanFrancisco C10 ...10.26
SparrowsPt.Md. B2 ....9.16
Sterling,Ill.(37) N15 ....9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2 ..$9.11
Atlanta A11 .....10.75
Bartonville,Ill. K4 .....9.21
Buffalo W12 .....10.65
Chicago W13 .....9.59
Crawfordsville,Ind. M8..9.21
Donora,Pa. A7 .....9.11
Duluth A7 .....9.11
Fairfield,Ala. T2 .....9.11
Houston S5 .....10.90
Jacksonville,Fla. M8 ....9.21
Johnstown,Pa. B2 .....9.11
Joliet,Ill. A7 .....9.11
KansasCity,Mo. S5 ....10.96
Kokomo,Ind. C16 .....9.21
LosAngeles B3 .....9.55
Minnequa,Colo. C10 ....9.35
Pittsburg,Calif. C11 ....9.80
S.Chicago,Ill. R2 .....9.11
S.SanFrancisco C10 ....10.31
SparrowsPt.,Md. B2 ....9.21
Sterling,Ill.(37) N15 ....9.21

BALE TIES, Single Loop Col.

AlabamaCity,Ala. R2 ...212
Atlanta A11 212
Bartonville,Ill. K4 214
Crawfordsville,Ind. M8 ..214
Donora,Pa. A7 212
Duluth A7 212
Fairfield,Ala. T2 212
Houston S5 217
Jacksonville,Fla. M8 214
Joliet,Ill. A7 212
KansasCity,Mo. S5 217
Kokomo,Ind. C16 214
Minnequa,Colo. C10 217
SparrowsPt.,Md. B2 214
Sterling,Ill.(7) N15 214

FENCE POSTS Col.

Birmingham C15 177
ChicagoHts.,Ill C2, I-2..177
Duluth A7 177
Franklin,Pa. F5 177
Johnstown,Pa. B2 177
Marion,O. P11 177
Minnequa,Colo. C10 182
Tonawanda,N.Y. B12 177

WIRE, Barbed Col.

AlabamaCity,Ala. R2 ..193**
Aliquippa,Pa. J5 .....190§
Atlanta A11 .....197*
Bartonville,Ill. K4 199
Crawfordsville, Ind. M8 ..198
Donora,Pa. A7 .....193†
Duluth A7 .....193†
Fairfield, Ala. T2 .....193†
Houston S5 .....198**
Jacksonville,Fla. M8 198
Johnstown,Pa. B2 .....196§
Joliet,Ill. A7 .....193†
Kansas City,Mo. S5 ..198**
Kokomo,Ind. C16 .....195†
Minnequa,Colo. C10 ..198**
Monessen,Pa. P7 .....196§
Pittsburg,Calif. C11 ....213†
Rankin,Pa. A7 .....193†
S.Chicago,Ill.R2 .....193**
SparrowsPoint,Md. B2 ..198§
Sterling,Ill.(7) N15 198

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
All'ppa,Pa. J5	..17.85	19.65
Bartonville K4	..17.95	19.80
Chicago W13	....17.85	....
Cleveland A7	....17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	..18.35	19.90†
Houston S5	....18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	..17.85	19.65§
Kan.City,Mo. S5	.18.10	....
Kokomo C16	....17.95	19.50†
Minnequa C10	..18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	..17.95	19.75§
St'ling(37) N15	..17.95	19.80
Waukegan A7	..17.85	19.40†
Worcester A7	....18.15	....

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2 .....187**
Aliq'ppa,Pa.9-11½ga.J5 190§
Atlanta A11 .....191*
Bartonville,Ill. K4 193
Crawfordsville,Ind. M8 ..192
Donora,Pa. A7 .....187†
Duluth A7 .....187†
Fairfield,Ala. T2 .....187†
Houston S5 .....192**
Jacksonville,Fla. M8 192
Johnstown,Pa.(42) B2 ..190§
Joliet,Ill. A7 .....187†
KansasCity,Mo. S5 ....192**
Kokomo,Ind. C16 .....189†
Minnequa,Colo. C10 ...192**
Pittsburg,Calif. C11 ...210†
Rankin,Pa. A1 .....187†
S.Chicago,Ill. R2 .....187**
Sterling,Ill.(7) N15 192

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
Ala.City,Ala. R2	.9.00	9.55**
Aliquippa J5	....8.65	9.325§
Atlanta(48) A11	..9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	....9.00	9.55†
Chicago W13	....9.00	9.55**
Cleveland A7	.....9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	...9.00	9.55†
Duluth A7	.....9.00	9.55†
Fairfield T2	.....9.00	9.55†
Houston(48) S5	..9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	....9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	..9.10	9.65†
LosAngeles B3	..9.95	10.625§
Minnequa C10	...9.25	9.80**
Monessen(48) P7	..8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	..9.95	10.50†
Rankin,Pa. A7	....9.00	9.55†
S.Chicago R2	....9.00	9.55**
S.SanFran. C10	.9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	.9.10	9.80
Struthers,O. Y1	...9.00	9.65†
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nuts 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish 50
Hot Galvanized and Zinc Plated:
Packaged 39.25
Bulk 46

BOLTS, Standard stock sizes:

Plain Finish 50
Hot Galvanized and Zinc Plated:
Packaged 39.25
*Bulk 46

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged ..... +55
Bulk ..... +16

Flat Head Cap Screws:
¾ in. and smaller, 6 in. and shorter:

Packaged ..... +85
Bulk ..... +38

Setscrews, Square Head, Cup Point, Coarse Thread:
Through 1 in. diam., 6 in. and shorter:

Packaged ..... + 5
Bulk 19

Through 1 in. diam., longer than 6 in.:

Packaged ..... +29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish 50
Hot Galvanized and Zinc Plated:
Packaged 39.25
Bulk 46

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2¾	12	54.23	63.57	48.13
3	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Standard All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2 .....6.875
Gary,Ind. U5 .....6.875
Lackawanna,N.Y. B2 ..6.875
Minnequa,Colo. C10 ...6.875
Seattle B3 .....7.025
Steelton,Pa. B2 .....6.875
Torrance,Calif. C11 ....7.025

JOINT BARS

Bessemer,Pa. U5 .....7.25
Fairfield,Ala. T2 .....7.25
Joliet,Ill. U5 .....7.25
Lackawanna,N.Y. B2 ..7.25
Minnequa,Colo. C10 ....7.25
Steelton,Pa. B2 .....7.25

AXLES

Ind.Harbor,Ind. S13 ...9.125
Johnstown,Pa. B2 .....9.125

SCREW SPIKES

Lebanon,Pa. B2 .....15.10

TRACK BOLTS, Untreated

Cleveland R2 .....15.35
KansasCity,Mo. S5 ....15.35
Lebanon,Pa. B2 .....15.35
Minnequa,Colo. C10 ....15.35
Pittsburgh S44 .....15.35
Seattle B3 .....15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2 .....10.10
Ind.Harbor,Ind. I-2, Y1.10.10
KansasCity,Mo. S5 ....10.10
Lebanon,Pa. B2 .....10.10
Minnequa,Colo. C10 ...10.10
Pittsburgh J5 .....10.10
Seattle B3 .....10.60
S.Chicago,Ill. R2 .....10.10
Struthers,O. Y1 .....10.10
Youngstown R2 .....10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 2½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	39.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y., R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	.. .	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders (except stainless). Prices will vary with total weight of the order. Base quantities for stainless sheets: 8000 lb. except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS				PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	STRUCTURAL SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.50	9.61	10.06	....	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	....	10.41	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.74	10.58	11.77	53.50	12.16	9.77	13.35	16.69	10.16	9.62	11.08
Buffalo	8.55	9.30	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	10.52	11.22	10.55	....	11.51	10.32	12.68	....	10.53	10.47	12.11
Chicago	9.22	10.20	10.70	52.00	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.34	10.26	10.75	65.30	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	56.18	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	10.57	10.05	11.75	....	12.13	9.98	12.98	16.95	10.21	9.81	11.18
Detroit	9.48	10.46	11.05	52.00	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	10.17	9.65	11.35	52.00	11.73	9.58	13.10	16.55	9.81	9.41	10.78
Indianapolis	9.66	10.64	11.14	....	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	61.27	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	....	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.84	....	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.62	10.60	11.10	....	11.79	9.62	11.05	16.40	9.97	9.46	11.75
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.00
Philadelphia	9.50	10.00	10.89	52.71	11.25	9.65	11.95	16.48	9.85	8.85	11.10
Pittsburgh	9.22	10.53	11.58	52.00	11.49	9.22	11.25	16.95	8.91	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	....	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	11.08	....	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	....	11.74	9.57	11.49	16.54	9.92	9.41	11.70
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	18.20	10.49	10.38	12.47
Seattle	11.35	12.45	13.40	54.02	12.80	10.80	10.20	17.80	11.59	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	54.02	12.65	10.65	16.20	17.85	11.35	10.80	13.01

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo.; Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183, Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ¼ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$16.00-16.50*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.70-3.20
60-65%	3.25-3.45

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.081 and heavier)	6.35
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Armature grade	9.50
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00
Tin Mill	(Per base box;
Products	100 lb base wt)
Coke tin plate (1.25 lb pot yield)	$10.60
Electrolytic tin plate (0.25 lb coating).	9.10
Black plate	8.30
Nails, Wholesale:	
Carload lots	Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60% $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe, ton del. east of Mississippi.	36.75
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	36.50
Bronze powder, 90/10.	54.20
Copper, all types	15.00*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	57.90
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20
	Dollars
Cobalt: 98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. †Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.80	$6.05	$5.75	$5.65	$5.95
Bar Size Angles	5.85	6.10	5.80	5.70	6.00
Structural Angles	5.75	6.00	5.70	5.60	5.90
I-Beams	5.70	5.95	5.65	5.55	5.85
Channels	5.70	5.95	5.65	5.55	5.85
Plates (basic bessemer)	5.45	5.80	5.50	5.40	5.70
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.20	24.70	24.40	24.40	25.20
Barbed Wire (†)	6.35	6.25	6.25	6.10	6.45
Merchant Bars	5.85	6.10	5.80	5.70	6.00
Hot-Rolled Bands	5.95	6.20	5.90	5.80	6.10
Wire Rods, Thomas Commercial No. 5	5.80	5.85	5.75	5.75	6.00
Wire Rods, O.H., No. 5	6.00	6.05	5.95	5.95	6.25
Bright Common Wire Nails (‡)	6.80	7.05	6.75	6.65	6.95

†Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank car or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5-7%, Si 4-6%, S 0.03% max., 20.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max., Si 1.0% max., *S 0.03%, 21.00c per lb of contained Cr, carlots, lump, bulk, delivered.*

Low-Carbon Ferrochrome (Simplex) Cr 63-66% or 68-71%: C 0.025% max., 31.50c; C 0.010% max., 32.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%: C 0.25% max., 33.00c. Cr 65-71%; C 0.05% max., 32.00c; C 0.10% max, 31.75c; C 0.20% max, 31.50c; C 0.50% max, 31.25c; C 1.0% max, 31.00c; C 1.5%, 30.75c; C 2.0% max, 30.50c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C. l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max).8M x D, carload, bulk, 20.05c per lb of alloy, carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 22.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 22.50c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon, Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05, less ton 24.1c. Delivered. Spot, and 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analysing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

***Ferroboron:** 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.*

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $5.25 per lb (all quantities) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

Scrap Price Advance Is Stalled

STEEL's composite on No. 1 heavy melting steel declines slightly, reversing uptrend of recent weeks. Signs of weakness developing. Demand is not up to expectations

Scrap Prices, Page 128

• **Chicago**—A reaction in the scrap market has dropped prices on the leading grades $1 to $3 a ton. The chief reason: A number of mills are reluctant to buy melting material at the presently quoted prices. Another significant reason: District and national steelmaking rates are failing to recover as predicted. Some slackening in demand for export tonnage is another factor. Further softening of the market is possible. There are reports that No. 2 bundles are selling under the quoted price level.

• **Pittsburgh**—Prices on the key grades of scrap are unchanged, but the tone of the market has softened. There's almost no consumer interest. Observers are predicting that bids on Pennsylvania Railroad scrap will be lower than last month's. Reduction of the rail rate on scrap shipped to Philadelphia for export has been approved but the new rate, $8.56 a ton, won't become effective until May 8. Brokers hope the effective date can be moved up to Apr. 15. They won't buy for export until the issue is settled.

• **Philadelphia**—For the first time in weeks, scrap prices are unchanged throughout the list. Export demand continues to provide major support to the market. Yard scrap is coming out freely, but buying by exporters and domestic mills is sufficient to keep prices steady.

• **New York**—Brokers' buying prices appear to have hit a peak. Quotations on all grades are steady, with demand balancing a somewhat easier flow of yard scrap.

• **Boston**—Recently revised railroad rates on steel scrap are closely tied to the movement of tonnage for export. From Westfield-Springfield to Boston or Albany the new rate of $3.70 a gross ton is applicable; from North Adams-Pittsfield, Mass., to Albany a rate of $2.25 is proposed.

• **Cleveland**—Since the start of the month the market has developed a noticeably softer tone. Indications are the recent bulge in buying and resulting runup in prices has run its course. Some market factors think prices have reached the point (over $35 a ton for No. 1 heavy melting) where the mills find it more advantageous to use hot metal. That view is being substantiated in some respects by the resumption of operations at a number of blast furnaces that had been idle for months.

• **Detroit**—The market is quiet. There's a little hesitation in trading following the slight drop off in list

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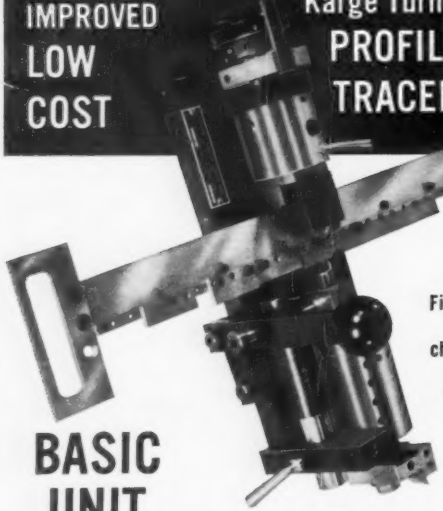

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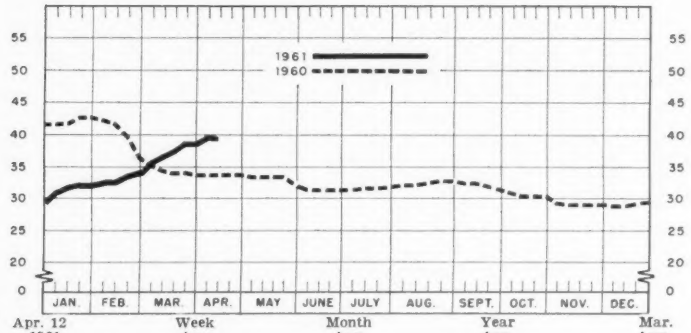
STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania—Compiled by STEEL.



Apr. 12, 1961	Week Ago	Month Ago	Year Ago	Mar. Avg.
$39.50	$39.67	$37.67	$33.66	$37.92

bidding last week. Brokers and dealers say they don't know whether the market will firm up or get soft.

• **Buffalo**—The local market has lost some of its luster due to a softening in demand for export tonnage along the Atlantic Seaboard.

• **Cincinnati**—The market is digesting a two-month price rise, and its tone remains firm on the chief steelmaking grades. There's no new buying, but the trade is filling orders recently placed for April shipment.

• **St. Louis**—The market is weak, and the price trend is uncertain. The price uncertainty is particularly noticeable in the case of the open hearth grades of scrap, reflecting slackening in local mill demand.

• **Birmingham** — A district steelmaker bought some electric furnace bundles at $37.50-$38.50 last week, and electric furnace scrap (3 ft and under) is now quoted $36-$37, with material 2 ft and under $37-$38.

• **Houston** — Exporters have reduced their offering prices as a result of the improved flow of material. Dealers are waiting to see if the move will force domestic prices down. Meanwhile, an increase of $1 a ton in the price of low phos plate and structural brought that grade up to $45-$46.

• **San Francisco**—The market is firm despite the absence of mill buying. The bolstering influence of exports continues. The Japanese mills are reported in the market for around 320,000 tons from West Coast ports this quarter.

• **Los Angeles** — Exports continue to support prices here, except No. 2 heavy melting which is off $2 a ton to $37, and No. 1 bundles which are wavering between $30 and $34. Machine shop turnings are quoted $2 higher at $14, and so are shoveling turnings at $14. The mills are showing a tendency to resist the higher prices.

• **Seattle** — The market is active and prices are firm. Domestic sales have increased, but exports are still providing the major support to the market. Indications are Japan will continue to be a strong buyer for several months.

Rails, Cars . . .

Track Material Prices, Page 121

American Steel Foundries is reducing prices of some of the major cast steel components it produces for the railroad industry. New price schedules, effective Apr. 12, will result in reductions of about 3 per cent on side frames and bolsters. Those products are made at the company's Transportation Equipment Div. which operates plants at Alliance, Ohio; Granite City, Ill.; and East Chicago, Ill.

Railroad equipment needs are a shade better, but the general level of railroad buying is far from active.

Bethlehem Steel Co.'s Lackawanna (N. Y.) plant will shortly start rolling 9000 tons of steel rails for Pakistan—part of an order for 50,000 tons. The bulk of the order—41,000 tons—will be filled at Bethlehem's Steelton (Pa.) plant.

Structural Shapes . . .

Structural Shape Prices, Page 118

Construction work is picking up seasonally, but demand for structurals is still spotty. Most new projects coming out are small, and fabricating shop order backlogs are showing little change. Few of the small shops have more than eight weeks' work on hand, and some of the larger fabricators can work tonnage into their schedules in less than three months.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

27,500 tons, superstructure, San Pedro Island toll bridge over main channel, Los Angeles Harbor, Calif., to Kaiser Steel Corp., Montebello, Calif.

3000 tons, Standard Insurance Co. 17 story office building, Portland, Oreg., to Fought & Co., Portland, Oreg.; Anderson-Westfall Co. Inc., Portland, general contractor at $6,388,054.

2500 tons, 540 ft space needle, Century 21 Exposition, Seattle, to Pacific Car & Found-

(*Please turn to Page* 133)

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Apr. 12, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Apr. 12	$39.50
Apr. 5	39.67
Mar. Avg.	37.92
Apr. 1960	33.67
Apr. 1956	54.90

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	31.00-32.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	*27.00-28.00*
No. 1 busheling	36.00-37.00
No. 1 factory bundles	45.00-46.00
Machine shop turnings	*14.00-15.00*
Mixed borings, turnings	*14.00-15.00*
Short turnings	*18.00-19.00*
Cast iron borings	*17.00-18.00*
Cut structurals:	
2 ft and under	40.00-41.00
3 ft and under	39.00-40.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	42.00-43.00
Electric furnace bundles	43.00-44.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	37.00-38.00
Stove plate	37.00-38.00
Unstripped motor blocks	27.00-28.00
Clean auto cast	33.00-34.00
Drop broken machinery	45.00-46.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	39.00-40.00
Rails, 2 ft and under	52.00-53.00
Rails, 18 in. and under	53.00-54.00
Random rails	46.00-47.00
Angles, splice bars	*44.00-45.00*
Railroad specialties	46.00-47.00
Rails, rerolling	57.00-58.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	40.00-41.00
No. 1 hvy melt., dealer	*37.00-38.00*
No. 2 hvy melting	*30.00-31.00*
No. 1 factory bundles	*42.00-43.00*
No. 1 dealer bundles	*37.00-38.00*
No. 2 bundles	*23.00-24.00*
No. 1 busheling, indus.	*40.00-41.00*
No. 1 busheling, dealer	37.00-38.00
Machine shop turnings	*15.00-16.00*
Mixed borings, turnings	*17.00-18.00*
Shovel turnings	*17.00-18.00*
Cast iron borings	*17.00-18.00*
Cut structurals, 3 ft	*41.00-42.00*
Punchings & plate scrap	*43.00-44.00*

Cast Iron Grades

No. 1 cupola	*43.00-44.00*
Stove plate	*38.00-39.00*
Unstripped motor blocks	*35.00-36.00*
Clean auto cast	*48.00-49.00*
Drop broken machinery	*48.00-49.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*41.00-42.00*
R.R. malleable	*47.00-48.00*
Rails, 2 ft and under	*51.00-52.00*
Rails, 18 in. and under	*52.00-53.00*
Angles, splice bars	*44.00-45.00*
Axles	*59.00-60.00*
Rails, rerolling	*59.00-60.00*

Stainless Steel Scrap

18-8 bundles, solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	95.00-100.00
430 turnings	50.00-55.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	33.00-34.00
No. 2 bundles	21.00-22.00
No. 1 busheling	30.00-31.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	32.00-33.00
Stove plate	26.00-27.00
Heavy breakable	25.00-26.00
Unstripped motor blocks	23.00-24.00
Charging box cast	27.00-28.00
Clean auto cast	38.00-39.00

CLEVELAND

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	24.00-25.00
No. 1 factory bundles	40.00-41.00
No. 1 bundles	36.00-37.00
No. 2 bundles	23.00-24.00
No. 1 busheling	35.00-36.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	33.00-34.00
Cut structurals, plate, 2 ft and under	40.00-41.00
Low phos. punchings & plate	35.00-36.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	36.00-37.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	45.00-46.00
Burnt cast	32.00-33.00
Drop broken machinery	46.00-47.00

Railroad Scrap

R.R. malleable	45.00-46.00
Rails, 2 ft and under	52.00-53.00
Rails, 18 in. and under	52.00-53.00
Rails, random lengths	44.00-45.00
Cast steel	42.00-43.00
No. 1 railroad cast	48.00-49.00
Railroad specialties	47.50-48.50
Angles, splice bars	43.50-44.50
Rails, rerolling	56.00-57.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	70.00-75.00
430 clips, bundles, solids	70.00-75.00
430 turnings	15.00-25.00

YOUNGSTOWN

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	25.00-26.00
No. 1 busheling	39.00-40.00
No. 1 bundles	39.00-40.00
No. 2 bundles	25.00-26.00
Machine shop turnings	14.00-15.00
Shovel turnings	19.00-20.00
Cast iron borings	19.00-20.00
Low phos.	39.00-40.00
Electric furnace bundles	40.00-41.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	31.00-32.00
No. 2 bundles	21.00-22.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	38.00-39.00
No. 1 machinery	45.00-46.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Rails, rerolling	*60.00-61.00*
Railroad specialties	41.00-42.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	28.50-29.50
No. 1 bundles	33.00-34.00
No. 2 bundles	*21.00-22.00*
No. 1 busheling	32.00-33.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	12.00-13.00
Shovel turnings	13.00-14.00
Cast iron borings	12.00-13.00
Low phos. 18 in.	39.00-40.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Heavy breakable cast	29.00-30.00
Charging box cast	35.00-36.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	46.00-47.00
Rails, random lengths	40.00-41.00

PHILADELPHIA

No. 1 heavy melting	43.00
No. 2 heavy melting	38.00
No. 1 bundles	44.00
No. 2 bundles	28.00
No. 1 busheling	44.00
Electric furnace bundles	45.00
Mixed borings, turnings	17.00
Shovel turnings	21.00
Machine shop turnings	16.00
Heavy turnings	27.00†
Structurals & plates	46.00-48.00
Couplers, springs, wheels	46.00
Rail crops, 2 ft & under	52.00-54.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	41.00
Drop broken machinery	50.00-51.00
Malleable	51.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	5.50-6.00†
Mixed borings, turnings	6.00-6.50†
Shovel turnings	7.00-8.00†
Low phos. structural & plates	32.00-33.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	29.00-30.00
No. 1 bundles	32.00-33.00
No. 2 bundles	23.00-24.00
No. 1 busheling	32.00-33.00
Cast iron borings	10.00-11.00
Machine shop turnings	19.00-20.00
Shovel turnings	21.00-22.00
Bar crops and plates	43.00-44.00
Structurals & plate	42.00-43.00
Electric furnace bundles	*37.50-38.50*
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	37.00-38.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Stove plate	44.00-45.00
Unstripped motor block	32.00-33.00
No. 1 wheels	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt	33.00-34.00
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	38.00-39.00
Angles, splice bars	43.00-44.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	35.00
No. 2 heavy melting	29.00
No. 1 bundles	35.00
No. 2 bundles	25.00
No. 1 busheling	34.00
Machine shop turnings	13.00
Shovel turnings	16.00

Cast Iron Grades

No. 1 cupola	41.00
Charging box cast	35.00
Heavy breakable cast	33.00
Unstripped motor blocks	35.00
Clean auto cast	41.00
Stove plate	34.00

Railroad Scrap

No. 1 R.R. heavy melt.	35.00
Rails, random length	39.00†
Rails, rerolling	52.00-53.00
Rails, 18 in. and under	41.00-42.00
Angles, splice bars	40.00†

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	36.00
No. 1 bundles	37.00-38.00
No. 2 bundles	26.00-27.00
Machine shop turnings	12.00-13.00
Low phos. plate & structurals:	
3 ft	43.00
2 ft and under	*45.00-46.00*

Cast Iron Grades

No. 1 cupola	36.00-37.00
Heavy breakable	26.00-27.00
Foundry malleable	30.00-31.00
Unstripped motor blocks	31.00-32.00

Railroad Scrap

R.R. heavy melt (3 ft)	43.00

LOS ANGELES

No. 1 heavy melting	40.00
No. 1 hvy melt (export)	40.00-43.00
No. 2 heavy melting	*37.00*
No. 2 hvy melt (export)	40.00
No. 1 bundles	*30.00-34.00*
No. 2 bundles	24.00-27.00
No. 2 bundles (export)	29.00
Machine shop turnings	*14.00*
Shovel turnings	*14.00*
Cast iron borings	18.00
Cut structurals and plate 1 ft and under	*52.00*

Cast Iron Grades

No. 1 cupola	*49.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*42.00*

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	41.00
No. 2 bundles	34.00
Shovel turnings	16.00-18.00
Electric furnace bundles	52.00

Cast Iron Grades

No. 1 cupola	40.00-42.00
Heavy breakable	36.00-37.00
Unstripped motor blocks	37.00
Stove plate (f.o.b. plant)	37.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00
No. 1 hvy (unprepared)	41.00
No. 2 heavy melting	41.00
No. 2 hvy (unprepared)	38.00
No. 2 bundles	34.00
Shovel turnings	16.00
Electric furnace bundles	50.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	39.00
Unstripped motor blocks	37.00
Stove plate (f.o.b. plant)	37.00

SAN FRANCISCO

No. 1 heavy melting	42.00**
No. 2 heavy melting	39.00**
No. 1 bundles	34.00**
No. 2 bundles	27.00**
Machine shop turnings	20.00**
Mixed borings, turnings	20.00**
Cast iron borings	20.00**
Heavy turnings	20.00**
Shovel turnings	20.00**
Cut structurals, 3 ft	44.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Charging box cast	34.00
Stove plates	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	*31.00*
No. 2 hvy melt, 2 ft & under	*29.00*
No. 1 bundles	*31.00*
No. 2 bundles	*21.00*
Mixed steel scrap	*23.00*
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	*31.00*
Unprepared	*25.00*
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

*For export add $4 dock charge.
**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

Here's what you can buy for cancer research— for $5 or $50 or $500,000!

You can give a cancer research laboratory five dozen glass culture tubes for $5, one instrument sterilizer for $50, one hundred medical fellowships for $500,000!

THERE ARE no bargains in cancer research. Hunting the cause of cancer—and ways of preventing cancer—is an exacting job. A demanding job. An *expensive* job. *It costs money.*

To give you an example, below are actual prices of equipment purchased with American Cancer Society funds. Little things, like glass slides. Massive things, like room-size total body radiation instruments. *All* vital to the fight against cancer.

So is your donation.

See what you can afford to buy. Then write that figure down on the coupon at the bottom of this page, and mail it with your contribution to CANCER, c/o your local Post Office. All gifts are tax deductible.

5 dozen tissue culture tubes $5

6 months' supply of rubber gloves $15

Food and care of 1500 mice for 1 day..... $15

1 dozen glass flasks for chemical studies $15

1 micrometer $19

1 mouth rebreathing apparatus and nebulizer.. $20

1 day's supply of radium needles $35

1 instrument sterilizer $50

1 blood cell calculator, used in leukemia studies $70

3 units of human serum $70

4 days' maintenance of a cancer research bed.. $100

1 water phantom for radiation dosage studies.. $100

1 kymograph manometer $134

100 AK mice for preparation of Coombs serum $150

1 egg incubator $150

1 constant temperature bath $200

1 isotope scanner $250

1 x-ray tube $480

2,000 millicuries of radioactive iodine $750

1 heart-lung machine for drug perfusion $2600

½ gram of cobalt 60 for radiation research.. $6000

1 grant for the study of the role of hormones in growth, including the cause, prevention and treatment of cancer.... $70,000

1 high-voltage, total body radiation instrument $100,000

100 training fellowships for 1 year $500,000

Grants to 5 scientists, each heading a cooperative 5-year research program $1,000,000

Guard your family. Fight cancer with a checkup and a check.

Mail this coupon to:
Cancer
c/o your local post office.

Attached is my gift of

$_____ to fight cancer.

My name_____

Address_____

City and State_____

_____

AMERICAN CANCER SOCIETY

Columbium Market Is Jolted

Nonferrous Metal Prices, Pages 132 & 133

PRESIDENT Kennedy's new defense program has knocked the props from under the market for columbium metal.

Better than 90 per cent of it has been going into the Aircraft Nuclear Propulsion Program (ANP). Now that program is dead for all practical purposes.

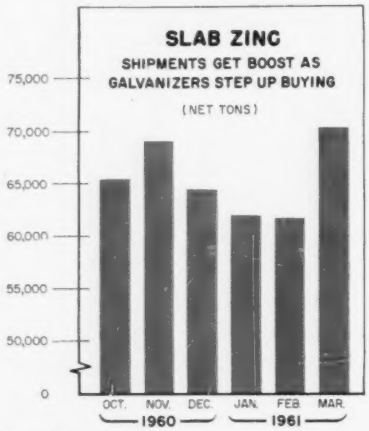
The atomic airplane has been an on-again, off-again program since 1945. The latest, and most ambitious, project encompassed the development of two competing propulsion systems: General Electric Co. was working on a direct cycle nuclear engine; Pratt & Whitney Div. of United Aircraft Corp. was developing an indirect cycle type, which was the big consumer of columbium. Now both are out.

Demands of the ANP program doubled columbium metal production in 1960 and would have led to a modest increase this year.

• **What Now?** — Columbium, like the other major refractory metals, seems to have a good future, but some lean times may be in store. Most of the work with the metal is experimental. It's one of the materials being considered for the Air Force's Dynasoar Program (another major candidate is molybdenum). Other potentials are equally bright, but for the time being, columbium's earliest chance for growth seems to be as an alloy in steelmaking (ferrocolumbium and ferrotantalum-columbium) rather than as a metal.

Quite possibly, say informed sources, the P&W reactor may be picked up for another defense program in the future.

• **Titanium Also Whacked** — Another Presidential decision, this one to trim the B-70 bomber program from ten to four prototypes, is disappointing to the titanium industry. The B-70 calls for substantial quantities of the metal in engine and structural applications. However, there's a significant difference between the effect of cancellation of the ANP program on columbium and curtailment of the B-70 on titanium. In the case of titanium, the industry is losing a market it never really had (only minor orders had been placed). Not only that: The metal has new and expanded civilian and military uses.



Source: American Zinc Institute Inc.

Zinc Shipments Rise

March shipments of slab zinc climbed to 70,074 tons for the best showing since last August (see chart), reports the American Zinc Institute Inc. On a day-to-day basis, business was slightly ahead of February's.

Better demand from galvanizers is primarily behind the mild upturn. The market for diecasting metal is still weak, principally because Detroit is buying sparingly.

A not so favorable development in the March statistics: Both production and producer stocks climbed. Smelter output went up to 78,007 tons, the highest since last May. By the end of the month, producer stocks had reached 222,889 tons, the largest since 1945.

Supply and demand should get in closer balance soon, metalmen believe. Forecasts are April will be a better month than March.

Tin Price Continues Up

The tin price continued to rise last week, stimulated by fears in some quarters that 1961 Free World production will fall about 10,000 tons under demand. As STEEL went to press, the New York price was over $1.08 a pound, the highest it had hit since December, 1956.

Large users in this country discount shortage fears; several of the biggest report stocks of six months or more.

Kaiser Ups Superpurity Capacity

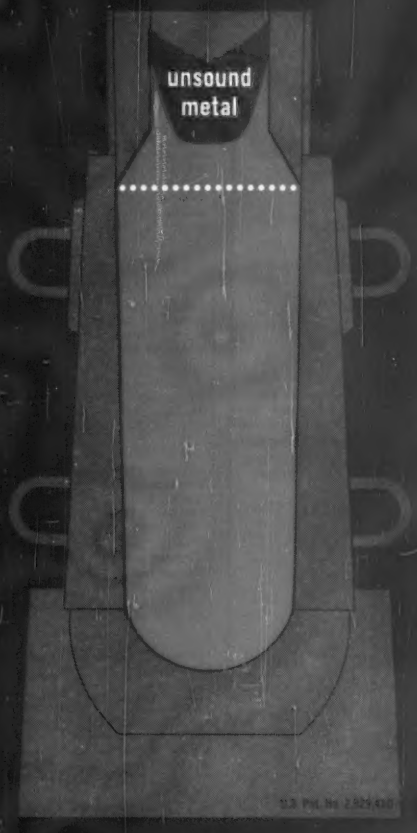
U. S. CAPACITY to produce superpurity aluminum received a big boost this week with the announcement by Kaiser Aluminum & Chemical Corp. that it has upped its refining facilities by 55 per cent. Kaiser's rated capacity is now 5.3 million lb annually.

Demand for the 99.99-per-cent-plus metal, commonly called "four-nine-aluminum," has been rising sharply over the last two years. Major applications include: Foil for electrical capacitors, petroleum catalysts, various decorative uses in such consumer products as appliances and costume jewelry. Consumption of the material is expected to more than double over the next few years.

U. S. capacity increased from 2.8 million lb in 1959 to around 7.3 million lb last year. It should hit 10 million lb this year, about 25 per cent of world capacity.

The other major U. S. producer of "four-nine" is Consolidated Aluminum Corp. Both Aluminum Co. of America and Reynolds Metals Co. produce small amounts.

what goes up (impurities)
keeps your costs down...



what remains...

(clean
sound
metal)

gives you new standards of trouble-free performance in specialty steel applications*

*Ask your Carpenter representative to prove how Carpenter's exclusive MEL-TROL® process can help you bring down costs, reduce rejects in your plant.

Carpenter steel

you can do it ***consistently*** better with Carpenter Specialty Steels for Specialists

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.
Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 29.00 deld.; custom smelters, 29.00; lake, 29.00 deld.; fire refined, 28.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $206-208 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 69.60.

Osmium: $70-90 per troy oz. nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.
Rhodium: $137-140 per troy oz.
Ruthenium: $55-60 per troy oz.
Selenium: $6.50-7 per lb, commercial grade.
Silver: Open market, 91.375 per troy oz.
Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.
Tantalum: Melting stock, $35 per lb; rod $60 per lb nom; sheet, $55 per lb nom.
Tellurium: $3.50-5 per lb, 100 lb or more.
Thallium: $7.50 per lb.
Tin: Straits, N. Y., spot and prompt, 109.75.
Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.
Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.
Zinc: Prime western, 11.50; brass special, 11.75; intermediate, 12.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 14.75; No. 5, 14.50 deld.
Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.
(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 21.75-22.25; 5% silicon alloy, 0.60 Cu max, 23.50-24.00; 13 alloy, 0.60 Cu max., 23.50-24.00; 195 alloy, 24.75-25.75; 108 alloy, 22.25-22.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 22.00; grade 3, 21.00; grade 4, 20.00.

Brass Ingot: Red brass, No. 115, 29.25; tin bronze, No. 225, 38.75; No. 245, 33.25; high leaded tin bronze, No. 305, 33.50; No. 1 yellow, No. 405, 28.75; manganese bronze, No. 421, 28.00.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) **Strip,** $1.935, f.o.b. Temple, Pa., or Reading, Pa.; **rod, bar, wire,** $1.935, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 34.355; l.c.l., 34.98. Weatherproof, 20,000-lb lots, 35.55; l.c.l., 36.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) **Sheets,** full rolls, 140 sq ft or more, $16.50 per cwt; **pipe,** full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) **Sheets,** 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	..	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 22.00-22.50; No. 2 heavy copper and wire, 20.75-21.25; light copper, 18.25-18.75; No. 1 composition red brass, 19.25-19.75; No. 1

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 29.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	54.13b	51.36c	....	55.32	25.000	25.000	24.250
Yellow Brass	48.10	33.71d	48.39	52.26	19.250	18.375	17.375
Low Brass, 80%	50.65	50.39	50.94	54.71	21.375	21.125	20.625
Red Brass, 85%	51.54	51.48	51.83	55.60	22.250	22.000	21.500
Com. Bronze, 90%	52.98	52.92	53.27	56.79	23.000	22.750	22.250
Manganese Bronze	56.56–56.50	50.22–50.24	60.47	....	18.000	17.750	17.250
Muntz Metal	50.94	46.25	....	....	18.125	17.875	17.375
Naval Brass	52.86	46.67	59.17	57.02	18.000	17.750	17.250
Silicon Bronze	59.49	58.68	58.78	77.90	24.500	24.250	23.500
Nickel Silver, 10%	63.66	65.99	65.74	....	24.125	23.875	12.062
Phos. Bronze, A-5%	74.59	75.09	74.34	76.52	26.125	25.875	24.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 18.25-18.75; new brass clippings, 16.25-16.75; light brass, 13.25-13.75; heavy yellow brass, 14.25-14.75; new brass rod ends, 15.25-15.75; auto radiators, unsweated, 14.50-15.00; cocks and faucets, 16.00-16.50; brass pipe, 16.50-17.00.

Lead: Soft scrap lead, 7.25-7.75; battery plates, 3.00-3.25; linotype and stereotype, 8.00-8.25; electrotype, 7.50-7.75; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-23.50; old sheets, 22.00-23.00; turnings, 16.50-17.00; rods, 22.00-23.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 3.50-4.00; new diecast scrap, 3.50-4.00; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 9.00-9.50; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.00-11.50; segregated high copper clips, 10.00-10.50; mixed low copper clips, 10.50-11.00; mixed high copper clips, 10.00-10.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 14.00; segregated high copper clips, 13.50; mixed low copper clips, 13.50; mixed high copper clips, 13.00-13.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery) **Beryllium Copper:** Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 55.00; light scrap, 50.00; turnings and borings, 35.00.

Copper and Brass: No. 1 heavy copper and wire, 26.25; No. 2 heavy copper and wire, 24.50; light copper, 22.25; refinery brass (60% copper) dry copper content, 23.25.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 26.25; No. 2 heavy copper and wire, 24.50; light copper, 22.25; No. 1 composition borings, 22.00; No. 1 composition solids, 22.50; heavy yellow brass solids, 16.50; yellow brass turnings, 15.50; radiators, 17.50.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 46.04; oval, 42.50; electrodeposited, 38.00; cast, 40.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 109.00; 500-1999 lb, 102.00; 2000-4999 lb, 98.50; 5000-29,999 lb, 97.50; 30,000 lb, 96.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 126.50; 200-499 lb, 125.00; 500-999 lb, 124.50; 1000 lb or more, 124.00.

Zinc: Balls, 18.75; flat tops, 18.75; flats 21.50; ovals, 20.75, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.00; 2000-5900 lb, 13.00; 6000-11,900 lb, 12.75; 12,000-22,900 lb, 12.50; 23,000 lb or more, 12.00.

Nickel-Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 500-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 2000 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 82.80; 100-600 lb, 73.20; 700-1900 lb, 70.40; 2000-9900 lb, 68.50; 10,000 lb or more, 67.20.

Stannous Chloride (Anhydrous): 25 lb, 158.70; 100 lb, 153.80; 400 lb, 151.40; 800-19,900 lb, 110.50; 20,000 lb or more, 104.40.

Stannous Sulphate: Less than 50 lb, 143.60; 50 lb, 113.60; 100-1900 lb, 111.60; 2000 lb or more, 109.60.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(Concluded from Page 127)

ry Co., H. S. Wright Construction Co., Seattle, general contractor.

822 tons, eight span, stringer bridge and approaches, Lubec, Maine-Campobello Island, N. B., to American Bridge Div., U. S. Steel Corp., Pittsburgh (114 tons), and York Structural Steel Co. (608 tons); Callahan Bros. Inc., Mechanic Falls, Maine, general contractor.

600 tons, International Business Machines Corp. laboratory, Connecticut, to Standard Structural Steel Co., Hartford, Conn.; Walter J. Staley Co., general contractor.

300 tons, erecting only, repairs to Pier 17, U. S. submarine base, New London, Conn., to Hughes Steel Erection Co. Inc., Philadelphia.

250 tons, estimated, construction FD radar program, SPS-26, Arena Air Force station, Mendocino County, California, to Electro Steel Structures Inc., and Western Erector Inc., Rialto, Calif.

240 tons, also 70 tons of reinforcing, Washington State, Snohomish County, girder span and undercrossing, to American Bridge Div., U. S. Steel Corp., Pittsburgh; Fioroto Bros., Seattle, general contractor at $742,977.

110 tons, drawbridge, Fore River, Quincy, Mass., to Builders' Iron Works, Somerville, Mass.

STRUCTURAL STEEL PENDING

1500 tons, first section, National Bureau of Standards complex, Gaithersburg, Md.; bids Apr. 19.

1402 tons, two, three span, continuous rivet bridges; and two, three span, composite, wide flange beam bridges, Richmond, Vt.; Lane Construction Co., Meriden, Conn., low on the general contract.

975 tons, state bridgework, Middlesex County, New Jersey; bids May 4; also required, 500 tons of reinforcing steel and 4400 linear ft of steel piles.

700 tons, repairs to bridge, New Bedford-Fairhaven, Mass.; G. Bonazzoli & Sons, Hudson, Mass., low on general contract; also required, 365 tons of reinforcing bars.

500 tons, hospital, West Reading, Pa.; bids closed.

428 tons, state highway bridge, FISH 61-3, Warren County, New York; Yonkers Contracting Co., Yonkers, N. Y., low on general contract.

330 tons, shopping center, Philadelphia; A. T. Orleans & Co., Philadelphia, is low on the general contract.

330 tons, state highway bridge, FINIE 61-1, Niagara County, New York; Depew Paving Co. low on general contract.

300 tons, tire fabric treating building, United States Rubber Co., Winnsboro, S. C.; bids closed Apr. 27.

272 tons, including 58 tons of concrete reinforcing bars and 190 tons of steel piling, state highway bridge, New Gloucester, Maine; H. E. Sargent Inc., Stillwater, Maine, general contractor.

219 tons, six-span composite wide flange bridge, Richmond-Williston I-89-29, contract No. 2; Landers & Griffin Inc., Portsmouth, N. H., low on general contract to Montpelier, Vt.

200 tons, radar towers at Kotzebue and Unalakleet, Alaska; bids to the U. S. Engineer, Anchorage, Alaska, Apr. 25.

REINFORCING BARS . . .

REINFORCING BARS PLACED

400 tons, public school, Philadelphia, to American Steel Engineering Co., Philadelphia.

250 tons, Century 21 Exposition monorail, Seattle, to Soule Steel Co., Seattle; Howard S. Wright Construction Co., Seattle, general contractor.

235 tons, Washington State, Tilton River bridge, to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Troy T. Burnham, Seattle, general contractor.

220 tons, plant addition, Western Electric Co., Reading, Pa., to American Steel Engineering Co., Philadelphia.

166 tons, Perimeter Building, Seattle Exposition to Pacific Coast Div., Seattle Bethlehem Steel Co.; Dahlgren Construction Co., Seattle, general contractor.

CLASSIFIED

Help Wanted

FINISHING SUPERINTENDENT

Steel mill Western New York area. Experienced in galvanizing, reinforcing bar fabrication, punch and brake press operations, shearing, painting and shipping. Must have proven organizational abilities. Relocation expenses paid. Salary commensurate with ability and experience. Please write, outlining qualifications and experience to:

Box 926, STEEL
Penton Bldg. Cleveland 13, Ohio

PATTERN SHOP MANAGER

Man should be capable of managing and running a Pattern Shop completely. Should be experienced in wood and metal pattern work, as well as shell pattern and shell core boxes. This is a growing situation. The man should be capable of building the operation, hiring and training personnel, and he will be responsible for all phases of running this business.

Reply Box No. 927, STEEL
Penton Bldg. Cleveland 13, Ohio

ADMINISTRATIVE SALES POSITION STEEL TUBING MANUFACTURER

Nationally recognized Mid-West steel tubing producer has an immediate opening for a man of executive calibre. 30-45 years old (preferred), with a current and thorough sales-technical background in electric resistance welded steel tubing. Attractive compensation with unusually fine incentive features. Submit complete resume giving personal history, education, experience and salary requirements. Replies held in strict confidence. Box 925, STEEL, Penton Bldg., Cleveland 13, Ohio.

For Sale

FOR SALE

Plate rolls 11 ft. x ¾" capacity, pinch type, 25 horsepower motor, complete with controls. Contact Mr. Al Ridella, Purchasing Agent.

STAINLESS PRODUCTS, INC.
Clifton, New Jersey
Telephone Prescott 8-3000

WANTED

MECHANICAL PRESS BRAKE, 1000 tons or heavier, with 20 ft. long die space.
PIPE STRAIGHTENER, 5 roll type, capacity to 10¾" O.D.

SWEPCO TUBE CORP.
Clifton, N. J.

MOTORS • GENERATORS • TRANSFORMERS
ELECTRIC EQUIPMENT CO.
World's Largest Inventory
Call collect: CL 4-9058
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SAFE, RELIABLE POSITIVE CONTROL

Convenience, positive control and protection for the operator are provided by the pistol-grip, push-button control station of the Coffing Quik-Lift electric hoist.

Loads can be raised or lowered while pulling a trolley mounted hoist since a strain cable is incorporated in the control cord. The control station is made of non-conducting, impact resistant plastic and the 115 volts at the station plus the interlocked push buttons make for safe operation. The V-type brake assures positive control of loads. Housing is of strong but light aluminum which makes for portability.

Ask your distributor about the twenty JF models with capacities ranging from ¼ to 2 tons or write for Bulletin ADH-65BB.

COFFING HOISTS

DUFF-NORTON COMPANY

Four Gateway Center, Pittsburgh 22, Pennsylvania

COFFING HOISTS
Ratchet Lever • Air
Hand Chain • Electric

DUFF-NORTON

DUFF-NORTON JACKS
Ratchet • Screw
Hydraulic • Worm Gear

REINFORCING BARS PENDING

4700 tons, also piling and plates, Olive Way-Republican Street Section, Seattle Freeway; Sound Construction & Engineering Co., Seattle, general contractor at $5,548,329, award placed by the Washington State Highway Department.

650 tons, including 600 tons of sheet piling, harbor improvements, Acushnet River, New Bedford, Mass.; Joseph Perry Inc., New Bedford, low on the general contract.

417 tons, state bridgework, LR 118, Delaware County, Pennsylvania; Bertani Construction Co. is low on the general contract.

411 tons, state bridgework, LR 1002, Monroe County, Pennsylvania; James Morrissey, Philadelphia, is low on the general contract.

300 tons, cell block addition, Washington State Penitentiary, Walla Walla, Wash.; Vern Johnson & Sons, Spokane, Wash., low at $630,398.

240 tons, second unit of women's residence hall, University of Washington, Seattle; Absher Construction Co., Puyallup, Wash., low at $578,277 to the Board of Regents.

100 tons plus, powerplant addition and utility tunnel, University of Washington, Seattle; general contract to James I Barnes Construction Co., Seattle, at $978,000.

PLATES . . .

PLATES PLACED

964 tons, high tensile, Grade Hy-80, Navy Purchasing Office, Washington, to U. S. Steel Corp., Pittsburgh.

PLATES PENDING

12,385 tons, 12¾ and 14 in. steel pipe piles, ¼ in. plate wall thickness, bids to the Board of Commissioners, New Orleans.

1270 tons, 36 to 48 in., water pipe, Hackensack, N. J.; pending.

175 tons, 700,000 gallon steel reservoir, including cathodic protection, water supply, Baker AFB, Oregon; bids Apr. 20 to the U. S. Engineer, Seattle.

139 tons, high tensile, grade Hy-60, Mare Island Navy Yard, California; bids in.

100 tons, standpipe, Woodbridge, N. J.; Buck Seifert & Son, low on general contract.

100 tons or more, also shapes, Vancouver Island ferry; Burrard Dry Dock Co. Ltd., North Vancouver, British Columbia, low at $3,595,460.

100 tons, water storage tank, King County, Wash., District No. 77; American Pipe & Construction Co., Portland, Oreg., low at $32,563.

RAILS, CARS . . .

RAILROAD CARS PLACED

Texas & Pacific, 35 seventy-ton insulated boxcars to Pullman-Standard Div., Pullman Inc., Chicago.

Gulf, Mobile & Ohio, 45 boxcars to the ACF Industries plant at St. Louis.

Missouri Pacific, 500 boxcars to Pullman-Standard Div., Pullman Inc., Chicago.

RAILROAD CARS PENDING

Trailer Train, 207 large flatcars for hauling highway trailers and automobiles, award expected shortly; these are in addition to 293 flatcars of which 108 were awarded recently to the Pullman-Standard Div., Pullman Inc., Chicago, 100 to ACF Industries, New York, 60 to Bethlehem Steel Co., Bethlehem, Pa., and 25 to an unnamed builder.

Atchison, Topeka & Santa Fe, 25 baggage cars scheduled for this year's program; they are in addition to 1775 freight cars announced earlier this year.

New York City Transit Authority, seeking state approval to purchase 1800 subway cars within the next three years. Of the total, 1200 would be for the IRT System and 600 for the BMT.

Northwestern Railway, Pakistan, 2500 cars of unspecified type, and 25 locomotives, contemplated under a $21 million expansion program.

Port of New York Authority, 50 commuter cars; bids Apr. 20. The cars will be for the New York Central Railroad.

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offers consistent uniformity in Oil-Tempered

CHROME SILICON

and

CHROME VANADIUM

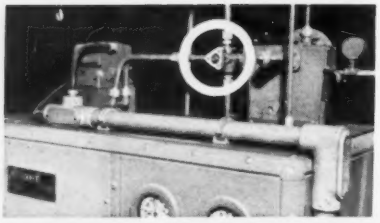
Wires

● Send for current **NEWCO** stock list.

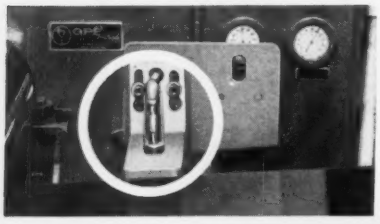
NEW ENGLAND HIGH CARBON WIRE CORP.

MILLBURY, MASSACHUSETTS

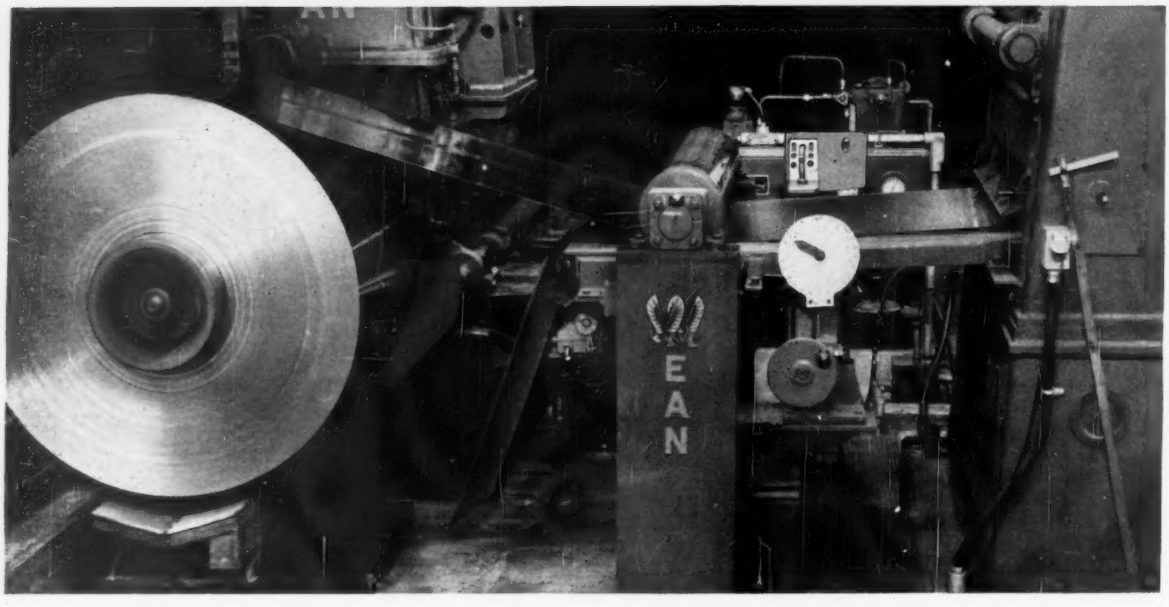
Offices and warehouses: Cleveland, Detroit, Los Angeles, Melrose Park and Millbury



GPE CONTROLS ADJUSTABLE-GAIN BOOSTER — Even a slight error in strip position produces maximum corrective force with complete stability. A simple screwdriver adjustment matches the control system to your strip processing line. If it doesn't have this advanced feature, it's just not a modern strip guide!



NON-CONTACT, NON-CLOGGING SENSING HEAD — Nothing touches the gleaming surface of the strip but a breath of air! And only GPE Controls gives you precise, simple pneumatic sensing with patented non-clogging design. Maintains accuracy of control without excessive maintenance.



High-finish tinplate line at Granite City Steel uses GPE Controls Edge Guide for mirror-edge wind-up coil

This GPE Controls air-hydraulic strip guide — on the "B" Electrolytic Tin Line at Granite City Steel — is one of the four similar units now operating in this modern mill. And *three more* GPE Controls Strip Guiding Systems will soon be in operation.

Here at the wind-up, the line operates at about 1000 feet per minute. GPE Controls Strip Guide continuously positions the wind-up reel to produce a mirror-like metal edge on the wind-up coil. Tinplate quality is protected in handling and shipping because the coil edge is perfectly smooth!

Steelmakers and steel users alike have shown their preference for GPE Controls by making it the most widely used strip guide. For simplicity, for control accuracy, for construction that cuts maintenance to the bone—you can't beat GPE Controls!

Write for informative Bulletin EG84

GPE Controls, Inc.

240 East Ontario Street • Chicago 11, Illinois.

GPE Controls

A Subsidiary of GENERAL PRECISION, Inc.

J&L gets new production versatility with two rugged Wean Shearing Lines

Jones & Laughlin Steel Corporation's Cleveland Works Division has added these modern Wean shearing lines to satisfy an increasingly wide range of customer requirements. Both lines can handle 30,000# coils up to 75" wide. The Upcut Shear Line (left) can side-trim and shear strip up to ¾" thick, with cut-lengths varying from 48" to 500", at a maximum speed of 140 fpm.

The combination Flying Shear Line (right) shears strip up to ¼" in thickness, with maximum cut lengths of 288", at speeds up to 350 fpm. This high-speed Wean line also permits combinations of side-trimming, slitting, temper passing and shearing or recoiling operations.

If you are planning expansion or modernization of your hot rolled strip shearing facilities, a Wean representative will welcome the opportunity to discuss your requirements. Wean's *creative engineering* can mean new profits for you.

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO

THERE'S A TIMKEN® BEARING TO FIT EVERY NEED

30 types and over 10,247 sizes make Timken bearings the most complete line of tapered roller bearings.

The little bearing you almost missed sitting there on top of the big one is too small to fit on your little finger. It's used in the reel of a power mower, and it weighs only 2.6 ounces. The big one is a four-row mill roll-neck bearing, weighing over six tons.

Between these two extremes you'll find a Timken® tapered roller bearing to fit every combination of radial and thrust loads, for all kinds of mountings, and for virtually all operating conditions. This most complete line of tapered roller bearings is sold and serviced by graduate engineers who can help you select the one bearing, from hundreds of possibilities, that will give you the most for your bearing dollar.

Make sure you check with your Timken bearing representative. He can tell you which bearing is the most economical for your application. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ontario.

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tapered roller bearings